

ENGINEER'S REPORT

ROAD REHABILITATION
SR 240 FROM 4.25 MILES EAST OF US 231 TO SR 75
DES. NO. 0100541

Prepared For:
Engineering Assessment Section
Division of Environment, Planning and Engineering
INDOT

December 6, 2004

Prepared By:



VS ENGINEERING, INC.

4275 North High School Road
vsei@vsengineering.com
Phone: (317) 293-3542

Indianapolis, Indiana 46254
www.vsengineering.com
Fax: (317) 293-4737

ENGINEER'S REPORT

ROAD REHABILITATION SR 240 FROM 4.25 MILES EAST OF US 231 TO SR 75 PUTNAM AND HENDRICKS COUNTIES

DES. NO. 0100541

Prepared by
Sanjay B. Patel, P.E.
Nickolas J. Reachmack, Project Engineer
VS Engineering, Inc.

December 6, 2004

I. PURPOSE OF REPORT

This Engineer's Report documents the engineering assessment phase and outlines the proposal to improve S.R. 240. Included is the examination and documentation of existing conditions and recommendation of an effective and efficient course of action. The project is described at a preliminary level and all relevant background data is included. The conclusions and recommendations of this report will guide the ongoing environmental and succeeding design phases. (This Engineer's Report is a deliberative and pre-decisional document, pending completion of environmental studies.)

II. PROJECT LOCATION

This road rehabilitation project is located on S.R. 240 from 600 feet west of the Deer Creek bridge (RP 4 + 17) to the west end of the McHaffie Branch bridge (RP 10 + 14). Equivalent termini referenced from state jurisdictional roads are 4.25 miles east of US 231 and 0.05 mile west of SR 75. Project length is 5.94 miles. This project excludes bridges near west and east termini (Deer Creek and McHaffie Branch) and intermediate bridges at Little Deer Creek and Buis Creek. The project is located east of Greencastle within Putnam and Hendricks counties (INDOT Crawfordsville District). Refer to Attachments A-1 through A-3 for project location maps.

III. PROJECT NEED AND PURPOSE

The need for this road rehabilitation project is due to substandard roadway cross section elements and geometry, including lane and shoulder widths, horizontal and vertical alignments, and stopping sight distances (SSD), among other deficiencies. Later sections titled "Existing Conditions" and "Crash Data and Analysis" further detail conditions. The objective of this project is to upgrade the cross-section and alignments to satisfy contemporary design standards, and to improve the operation of S.R. 240.

IV. EXISTING CONDITIONS

Refer to Attachment A-4 through A-14 for aerial photographs and A-16 through A-23 for ground level photographs of SR 240 intersections and drainage structures.



Figure 1. SR 240, looking east at beginning of project, near CR 450E.

The Crawfordsville District Development office provided a set of drawings dated 1935 (Project No. 552 SEC), with annotations that “R/W indicated was not purchased.” The horizontal alignment of S.R. 240 shown on these plans is generally consistent with the actual alignment. Unfortunately, the vertical alignment is not shown (but the original ground profile is shown). In addition, many of the existing cross drainage structures conform to those shown on these plans.

Pavement records indicate that the eastern 3.85 miles of this project was constructed in 1928 with 8” thick concrete to a width of 18’. This portion was widened to 20’ and resurfaced in 1962, and resurfaced again in 1970 and 1991. Usable shoulders are 4’ wide (2’ paved). The western 2.09 miles of this project was constructed in 1945 with 9” thick asphalt to a width of 18’. It was resurfaced in 1970 and 1991. The present roadway consists of two 10’ lanes with 4’ usable shoulders and 2’ paved asphalt shoulders in fair condition. (Current minimum design standards require 11’ wide lanes, 8’ usable shoulders and 2’ paved shoulders for 3R projects; 4R current design standards require 12’ wide lanes, 10’ usable shoulders and 8’ paved shoulders.) Shoulder foreslopes are generally 3:1 but vary from 1:1 to 2:1 at culvert drainage headwalls. Ditches are located approximately 16’ left and right of centerline where roadway grade is close to original ground line. The ditches are shallow (up to 1’ deep), unpaved with grass lining, and vee-shaped with 2:1 back slopes.

S.R. 240 is functionally classified as a **Rural Major Collector** over rolling terrain. All intersecting roads are **Rural Local Roads**. S.R. 240 is on the State 3R system, but lies off the National Highway System (NHS) and National Truck Network.

Posted speed limit on S.R. 240 is 55 mph. All roads intersecting SR 240, except two, have no posted speed limits. The two exceptions, CR 650E and CR 725E, intersect SR 240 on the south side and both have posted speed limits of 45 mph.

Within the project limits the original (1935) horizontal alignment of S.R. 240 included 16 horizontal curves and 12 additional points of intersection (PI) which had no horizontal curves. An edge of pavement survey performed in early



Figure 2. SR 240 at Putnam County Humane Society entrance, looking west.

2004 determined that the current alignment contains 13 horizontal curves whose locations and curve data are listed in Table 1 below. (Substandard alignments are indicated by bold type face.) County road intersection stations in the table are approximate and have been estimated from as-built plans and the edge of pavement survey.

Table 1: SR 240 CENTERLINE HORIZONTAL ALIGNMENT				
PI Station	Length, Ft.	Δ°	Radius, Ft.	V _{Design} , mph
POT 240+65.23	BEGINNING OF PROJECT			
242+54.74	368.66	18°03'13" Rt	1170	59
250+37	CR 450E Intersects SR 240 on south side			
255+17.79	675.22	14°19'43" Rt	2700	80
258+74	CR 140S Intersects SR 240 on south side			
263+56.47	243.29	9°13'53" Rt	1510	65
270+13.12	211.45	14°15'12" Rt	850	52
277+42.68	303.20	11°34'53" Lt	1500	65
293+68	CR 500E Intersects SR 240 on south side			
308+28.55	250.49	26°05'42" Lt	550	43
308+43	CR 525E Intersects SR 240 on north side			
335+26.37	109.00	6°14'44" Rt	1000	55
348+31.16	338.78	3°57'41" Lt	4900	>80
374+54	CR 650E Intersects SR 240 on south side			
380+98.15	36.30	4°09'33" Rt	500	42
401+00	CR 700E Intersects SR 240 on north side			
414+55	CR 725E Intersects SR 240 on south side			
441+72	CR 775E Intersects SR 240 on north side			
450+50.55	777.91	9°05'46" Lt	4900	>80
468+54	CR 825E Intersects SR 240 on north side			
480+30.12	155.21	7°43'59" Lt	1150	59
481+79	CR 850E Intersects SR 240 on south side			
486+51.66	280.84	12°22'39" Lt	1300	62
493+12.91	615.90	5°25'44" Rt	6500	>80
508+28	CR 900E Intersects SR 240 on north side			
POT 554+32	END OF PROJECT			

Vertical alignment consists of about 27 sag and 27 crest curves. Of these, about 11 crest and 11 sag vertical curves in 9 locations do not meet current 3R or 4R requirements for stopping sight distances (SSD). Existing grades vary from level to about 4.7%.



Figure 3. CR 450E, looking south.



Figure 5. SR 240 at CR 140S, looking west of southwest.

All county and local roads intersect S.R. 240 at one-way stop controlled "T" intersections with S.R. 240 free flowing. There are no traffic signals or flashing beacon traffic control devices located within or near the termini of this project. Speed limit signs for 55 mph are posted in both directions at the CR140S intersection and about 600' west of CR 775E. AT RP 10+00, a 55 mph speed limit is posted for westbound traffic. Advisory speed warnings are posted at approaches to the curve between CR 140S and RP 5+00 (50 mph) and at approaches to the curve at CR 525E (40 mph). Also, on the latter curve, chevrons and an arrow are displayed in both directions on the south side of SR 240.

There are three bridges within the project limits located over Deer Creek, Little Deer Creek, and Buis Creek. A fourth bridge, over McHaffie Branch, is located about thirty feet beyond the east of the end of the project.

The bridge over Deer Creek (signed RP 4 + 30) was constructed in 1966 and reconstructed in 1995 which included a concrete overlay and concrete railing. It is a three span (32.5', 45.5', 32.5') continuously reinforced concrete slab constructed on a 25° skew with a clear roadway width of 40.0'. Deck, superstructure, and substructure overall conditions were each rated 7 and sufficiency rating was 96 when last inspected on August 7, 2002.

The bridge over Little Deer Creek (signed RP 6 + 81) was constructed in 1964 and reconstructed in 2001 which included widening on both sides, concrete overlay, concrete railing, and revetment rip rap. It is a single span (48.92') reinforced concrete slab constructed on a 20° skew with a clear roadway width of 39.4'. Deck, superstructure, and substructure overall conditions were each rated 8 and sufficiency rating was 98 when last inspected on August 7, 2002.

The bridge over Buis Creek (signed RP 9 + 04) was constructed in 1966 and reconstructed in 1996 which included a concrete overlay and concrete railing. It is a three span (16.5', 22.0', 16.5') continuously reinforced concrete slab constructed on a 35° skew with a clear roadway width of 43.0'. Deck, superstructure, and substructure overall conditions were each rated 7 and sufficiency rating was 100 when last inspected on August 7, 2002.

The bridge over McHaffie Branch (signed RP 10 +15) was constructed in 1991. It is a three span (20', 27', 20') continuously reinforced concrete slab constructed on a 0° skew with a clear roadway width of 43.0'. Deck and superstructure overall condition were each rated 7, substructure overall condition was rated 6, when last inspected on August 7, 2002. Sufficiency rating as of April 1, 2003 was 97.

There are 15 small drainage structures (culverts) under S.R. 240 (Table 2 below).

Table 2: SMALL DRAINAGE STRUCTURES			
STATION	SKEW	DESCRIPTION	CONDITION
260+96	0°	12"x12" Conc. Box, Conc Hdwls	Fair condition.
269+40	0°	18"x18" Conc. Box, Conc Hdwls	Fair condition.
275+33	0°	34'x3'x2' Conc Box, Conc Hdwls	Needs cleaning. Headwalls weathered.
289+19	0°	25.5'x18"x18" Conc Box, Conc Hdwls	Fair condition. Headwalls damaged.
302+42	0°	24'x18"x18" Conc Box, Conc. Hdwls	Fair condition.
310+51	0°	28.75'x18"x18" Conc Box, Conc Hdwls	Needs cleaning. Headwalls weathered.
331+17	0°	2-35.5'x30"CMP	North end crushed. Some rusting.
335+63	0°	2-34'x30"CMP	Fair condition.. Some silting.
366+86	0°	26'x2'x2' Conc Box, Conc Hdwls	Headwalls badly damaged.
374+02	0°	25'x24"x18" Conc Box, Conc Hdwls	Silted up. South headwall broken.
414+69	0°	30'x12'x3' CIP Box, Conc hdwls & 1 wing	Fair condition.. Needs cleaning.
459+93	0°	28.5'x3'x3' Conc Box, Conc Hdwls	Fair condition. Needs cleaning.
477+19	0°	30.5'x12'x4' CIP Box, Head & wing walls	Fair condition.. Needs cleaning.
483+50	0°	30.5'x12'x3' CIP Box, Conc Hdwls	Fair condition...
488+37	0°	30'x2'x2' Conc Box, Conc Hdwls	Badly damaged north end
513+14	0°	33'x24" CMP	North end crushed. Ditch cleaning req'd.
523+53	33° Lt	CMP arch, Conc Hdwls	Fair condition.



Figure 5. 34' x 2' rise x 3' span culvert, station 275+33, looking north.



Figure 6. Broken headwall on north side of SR 240, 670' east of CR 850E.

Overhead and underground utilities exist along one or both sides of the right-of-way along the entire project length.

Apparent existing right-of-way varies from 66 feet total (33 feet from roadway centerline) west of CR 525E, 60 feet total (35 feet north of centerline 25 feet south) from CR 525E to 4,800 feet east of CR 525E, then 50 feet total (25 feet from centerline) to Little Deer Creek bridge, and then 40 feet total (20 feet from centerline) to the east project limit.

Land use is predominately agricultural with rural residences located along the highway. There are one or two commercial establishments within the project limits.

V. TRAFFIC DATA

INDOT Traffic Statistics Unit has provided base year 2003 annual average daily traffic volumes and projected traffic forecasts for SR 240 intersections with CR 500E and SR 75 and for SR 240 roadway in the vicinity of CR 725E. These are summarized in Table 3 below.

County road traffic volumes are listed in Appendix B-1. Turning movement volumes and forecasts for the intersections at CR 500E and SR 75 can be found in Appendices B-2 and B-4.



Figure 7. SR 240 at CR 650E, looking east.

Table 3: SR 240 Traffic Characteristics										
Location	Direction	AADT				DHV		Commercial Vehicles		
		2003	2008	2018	2028	AM	PM	AADT	AM	PM
West of CR 500E	Eastbound	2258	2592	3286	4006	5%	10%	7%	7%	5%
	Westbound	2225	2555	3239	3948	8%	9%	8%	8%	5%
	TOTAL	4483	5147	6525	7954					
	LOS (AM/PM)	A/B	A/B	B/B	B/C					
CR 500E to CR 725E	Eastbound	1952	2241	2841	3463	8%	8%	7%	5%	2%
	Westbound	1999	2295	2909	3546	5%	10%	8%	6%	5%
	TOTAL	3951	4536	5750	7009					
	LOS (AM/PM)	A/B	A/B	B/B	B/C					
CR 725E to SR 75	Eastbound	1797	2063	2615	3188	8%	7%	7%	3%	5%
	Westbound	1858	2133	2704	3296	5%	11%	8%	9%	4%
	TOTAL	3655	4196	5319	6484					
	LOS (AM/PM)	A/A	A/B	B/B	B/B					

Projected traffic capacity was analyzed based on rural 2-lane methodology outlined in HCM 2000 using HCS software (See Table 3 above). The INDOT Design Manual, in chapters 53 and 55, prescribes a minimum LOS respectively of “C” (“B” desirable) for 4R projects and “D” (“B” desirable) for 3R projects. Table 3 shows that, for both 4R and 3R criteria, these criteria can be maintained through the 2028 design year.

VI. CRASH DATA AND ANALYSIS

The INDOT Crash Analysis Unit has provided crash (accident) data for the years 1998 through 2000. A summary of the crash data for those years is shown in Table 4 below.

Table 4: SR 240 Crash Data and Analysis (1998 through 2000)													
Road Segment	Year	Number of Crashes	Crash Severity			Total Number Of		Crash Types					
			Property Damage Only	Personal Injury	Fatal	Injuries	Fatalities	Rear End	Head On	Sideswipe	Off Road	Right Angle	Animal
Project Beginning to & including CR 500E	1998	8	6	1	1	4	1	1			4	1	2
	1999	3	2	1		2		1			1		1
	2000	1	1						1				
	Totals	12	9	2	1	6	1	2	1	0	5	1	3
	%		75	17	8			16.7	8.3	0.0	41.7	8.3	25.0
East of CR 500E to & including CR 725E	1998	5	5							1	1	1	2
	1999	3	3								2		1
	2000	3	2	1		1				2	1		
	Totals	11	10	1	0	1	0	0	0	3	4	1	3
	%		91	9	0			0.0	0.0	27.3	36.4	9.1	27.3
East of CR 725E to End of Project	1998	4	4								3		1
	1999	3	2	1		1			1	1			1
	2000	1		1		1				1			
	Totals	8	6	2	0	2	0	0	1	2	3	0	2
	%		75	25	0			0.0	12.5	25.0	37.5	0.0	25.0



Figure 7. SR 240 at CR 525E, looking east.

“Off road” and “animal” are the predominant crash types common to all segments of this project. (No W11-3 “deer crossing” signs are posted.) The rear end crashes occurred at the CR 500E

intersection. Sideswipe accidents occurred at non-intersection locations, mostly during peak hours, and all were located between 1000' east of CR 525E and 400' east of CR 900E. Off road and sideswipe crashes point toward poor roadway geometrics (vertical and/or horizontal alignments, SSD, ISD) and cross sectional elements (lane and shoulder widths, roadside ditch design) as being contributing factors. The 1998 fatal event was an off road crash at night under dry conditions on a curve about 500' west of the Putnam County Humane Society driveway entrance. It involved one westbound vehicle striking a fixed object. In 1997, there was a one vehicle westbound off road nighttime crash under dry conditions, 300' west of CR 525E intersection (Figure 6, above) with two fatalities. The vehicle struck a sign post.

VII. PROJECT RECOMMENDATIONS

General

Due to the moderately high traffic volumes and the nature of past crash events, the roadway shall be widened to provide one 12' wide lane in each direction with 7' usable and 6' paved shoulders, the alignments modified at select locations, and the roadsides upgraded.

Horizontal Alignment

Substandard horizontal alignments at three locations are listed below in Table 5, with recommendations for appropriate revisions. The curves at PI 270+13 and PI 308+28 PI require larger radii to meet the 55 mph design speed. PI 380+98 is too close to the Little Deer Creek bridge to enlarge the existing 500' radius and a reverse curve with radii of 1500' and 4100' will be needed to replace it. Study of aerial photos indicates that there may be substandard horizontal alignment elsewhere, in the form of centerline tangent intersections in excess of 0°30' which have no curves fitted to them. This shall have to be determined by surveys and further assessment by the designer, since the aerial photos themselves may be presenting an imprecise view of existing alignment.

TABLE 5: Revisions to Horizontal Alignment				
PI Station	Radius, Ft.	Δ°	Length, Ft.	V_{existing}
Revision Action				V_{design}
270+13.12	850	14°15'12" Rt	211.45	52
Increase Radius	1000	"	248.77	55
308+28.55	550	26°05'42" Lt	323.70	43
Increase Radius	1000	"	455.44	55
380+98.15	500	4°09'33" Rt	36.30	42
Replace with reverse curves	1500	6°29'12" Rt	169.82	55
	4100	2°11'21" Lt	156.65	55

The revised horizontal alignments are shown on plan and profile drawings in the appendix and listed in Table 5, above. These are provisional and are to be refined by the designer. Drawings in Appendices A-4 through A-14 show a conceptual horizontal alignment plan. The plan must be refined by the designer, shifted as necessary to minimize impacts and improve design. While in general the centerline is retained, there

are likely segments where the designer will find it advantageous and cost effective to shift to one side or the other.

Vertical Alignment

There are nine locations along SR 240 which do not meet current standards for stopping sight distance due to substandard vertical alignment. The designer must take care to avoid existing bridges when refining vertical alignments. Vertical alignment revisions shall require modifications to some existing small drainage structure lengths and may preclude the lowering of inverts of small drainage structure replacements recommended in the Preliminary Hydraulic Review, Appendices B-5 through B-11.

Proposed vertical alignments are shown on the profiles in Appendices A-4 through A-14 and are listed below in Table 6. These are provisional and are to be refined by the designer.

TABLE 6: Vertical Alignment Revision Sites		
From Station	To Station	Length, Ft.
POVT 272+54	POVT 278+04	550
POVT 297+35	POVT 301+76	441
POVT 308+43	PVT 322+17	1374
POVT 374+54	PVT 385+46	1092
POVT 413+15	POVT415+40	225
PVC 443+24	PVT 449+04	580
POVT 480+92	PVT 496+18	1526
POVT 511+79	PVT 528+52	1673
POVT 543+21	PVT 554+46	1125

Drainage

The existing 2'x2' concrete box at station 366+86 does not have sufficient capacity for the 100 year storm event and should be reconstructed as a 3' rise by 12' span concrete box with wingwalls. The structure at station 414+69 (Structure No. 6, Preliminary Hydraulic Review) shall be relocated due to revised intersection alignment. Two sites with damaged corrugated metal pipe (CMP), stations 331+17 and 513+14, should be replaced. The designer shall follow recommendations of the Preliminary Hydraulic Review, Appendices B-5 through B-10, for reconstruction of existing structures.

Small drainage structures shall be lengthened due to roadway widening. Small structure headwalls, including damaged headwalls noted in Table 2 above, shall be relocated and replaced as shown in Appendix A-15, "Typical Sections".

In accordance with the previously cited Preliminary Hydraulic Review, existing bridges shall not be included as part of this project.

Pavement

It is envisioned that existing pavement will be retained and widened where realignment is not required. A preliminary pavement design thickness of 350mm \pm 50mm (14" \pm 2")

has been proposed by the Materials and Tests Division of INDOT (See Appendix B-7) The designer shall consult INDOT Materials and Tests Division for the final pavement type and thickness. This paving section shall be used for widening where the existing pavement is to remain in place and be milled and/or overlaid. This paving section is also to be used where complete replacement is required due to vertical and/or horizontal realignment.

VIII. DESIGN FEATURES

While alignment revisions comprise about 32% of the total length of project, SR 240 is off the NHS, on the 3R network (as opposed to the 4R network), and functionally classified as a collector (as opposed to an arterial), therefore 3R design standards have been deemed appropriate.

Geometrics:	INDOT Design Standards for 3R Projects Geometric Design of Existing Non-Freeways (3R) INDOT Design Manual, Chapter 55.
Functional Classification:	Rural Major Collector
Design Classification:	3R, State Rural Collector, 2 lanes, AADT > 5000 (Table 55-3B)
Project Length:	5.94 miles
Design Speed:	55 mph
Terrain:	Rolling
Access Control:	None
Roadway Section:	Two 12' wide through lanes 6' wide paved shoulders (7' wide usable)
Obstruction Free Zone	17'
Parcels Affected:	55
Residential Driveways:	53
Commercial/Industrial Driveways:	2
Permanent R/W Required:	39.2 acres

IX. ESTIMATED COST

Excavation and Paving	\$3,990,000
Small Drainage Structures	\$280,000
Signing and Markings	\$220,000
Maintenance of Traffic	\$180,000
Contingencies	\$370,000
Construction Total	\$5,040,000
Right-of-Way	\$350,000
Engineering	\$150,000
Project Total	\$5,540,000

X. SURVEY REQUIREMENTS

The required survey limits along S.R. 240 extend from 1000 feet west of the Deer Creek Bridge to the McHaffie Branch bridge for a length of 6.16 miles. In addition, surveys along each of the 11 intersecting county roads should be made to a distance of 300 feet from the SR 240 centerline, forming a total survey length of 6.79 miles. Coverage should extend 80 feet left and right of roadway centerlines.

XI. TRAFFIC MAINTENANCE

This project will require closing S.R. 240 and providing an official detour using U.S. 231, U.S. 40, and S.R. 75. Since access for local traffic must be maintained at all times, it is recommended that construction proceed in phases involving reconstruction of S.R. 240 in specified segments while utilizing the county roads as unofficial local detours.

What is presented above is a preliminary maintenance of traffic (MOT) proposal. The designer is instructed to further evaluate and refine the traffic maintenance plan in concert with the Crawfordsville District, as there may be other viable options to the recommendations made at this stage.

XII. RIGHT-OF-WAY SUMMARY

Apparent existing right-of-way varies from 66 feet total (33 feet from roadway centerline) west of CR 525E, 60 feet total (35 feet north of centerline 25 feet south) from CR 525E to 5,100 feet east of CR 525E, 50 feet total (25 feet from centerline) to Little Deer Creek bridge, and 40 feet total (20 feet from centerline) to east project limit.

Approximately 39 acres of additional permanent right-of-way will be required along both sides of S.R. 240 for the majority of the project length, affecting 50 parcels with no relocations. A total of less than 1 acre of temporary right-of-way will be needed for driveway reconstruction, affecting 47 parcels. Freeboard for underdrains were not considered in preparing right-of-way estimates.

In locations where non-typical roadside treatment may be beneficial (e.g., where a residence is located close to the highway), the designer should consider measures to minimize right-of-way impacts, such as closing the roadside ditch, making minor shifts in the centerline location, etc.

Proposed right-of-way requirements presented in this Engineer's Report are approximate, developed using limited information available at this stage. Later phases of project development will establish precise right-of-way requirements. The more refined right-of-way limits generated from these later phases may differ from the estimates presented at this time.

XIII. ENVIRONMENTAL CONSIDERATIONS

The INDOT Environmental Assessment Section is continuing its investigation of the anticipated impacts incurred with the described recommended roadway improvements and will prepare the required environmental documents. Based on cursory inspection, it

is not anticipated that this project will generate any significant social, economical, or environmental impacts.

The proposed right-of-way dimensions, areas, and number of parcels presented in this Engineer's Report are estimates at this stage in development of the project. Assessment of social, economic, and environmental impacts should account for the unrefined nature of these right-of-way limits by assessing potential impacts a reasonable extent beyond the proposed preliminary limits.

XIV. OTHER PROJECTS

This project has a ready for contracts date of October 15, 2008. INDOT has no other projects planned which would impact the proposed official detour.

XV. CORRESPONDENCE AND COORDINATION

A field investigation for this project was held on October 21, 2002. See Appendices C-1 and C-2 for minutes. The project and this Engineer's Report has undergone and is undergoing coordination and review with various parties, including Crawfordsville District Offices; central office Environmental Assessment Section, Engineering Assessment Section and Design Division; and Materials Engineering Section of Materials and Tests Division,

XVI. CHANGES TO PROPOSAL

The Engineering Assessment section shall be consulted if deviation from the herein Project Recommendation is determined necessary during a later phase. The person initiating the change should send a memo giving justification and cost impacts of the changes to the Engineering Assessment Section Manager for concurrence. If the designer initiates the changes, the memo should be routed through the appropriate Design Development Section Manager.

Report Recipients

Kimberly Peters	Design Program Coordinator (3 copies)
Anne Rearick	Design Section Manager
William Schmidt	Design Location Survey
Lyle Sadler	Environmental Assessment
Athar Khan	Geotechnical Engineer
Sally Morgan	Land Acquisition
Steve Isenhower	Crawfordsville District Development Engineer
Brad Steckler	Engineering Assessment (Original and 1 copy)

Appendices:

Appendix A
Project Location-State
Project Location-INDOT District
Project Location-USGS Topo

Plan and Profile Drawings
Typical Sections
Ground Photos- SR 240 Intersections
Ground Photos- SR 240 Small Drainage Structures

Appendix B
Traffic Forecasts
Preliminary Hydraulic Review
Preliminary pavement Design

Appendix C
Field Site Investigation

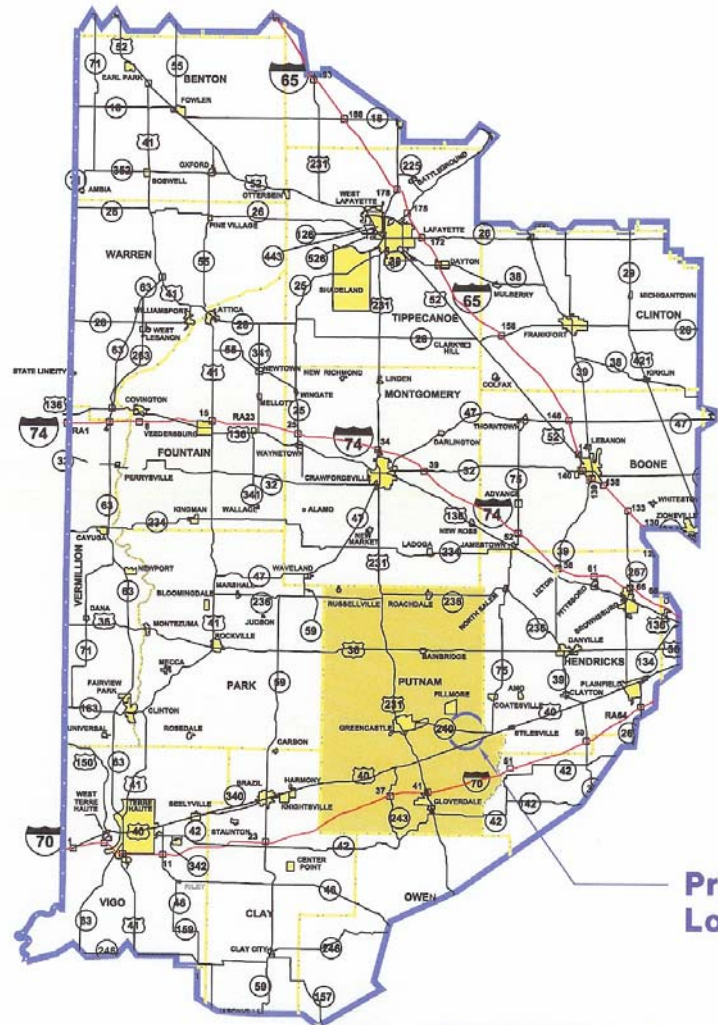


**Project
Location**

PROJECT LOCATION - STATE

**DES. NO. 0100541
PUTNAM COUNTY
ROAD NO. 1 S.R. 240
From 4.25 Miles E of US 231 to SR 75
Road Rehabilitation
SCALE - NTS**

A-1



**Project
Location**

INDOT, CRAWFORDSVILLE DISTRICT 1

PROJECT LOCATION - INDOT DISTRICT

DES. NO., 0100541
PUTNAM COUNTY
ROAD NO., S.R. 240
From 4.25 Miles E of US 231 to SR 75
Road Rehabilitation
SCALE = NTS

A-2



PROJECT LOCATION - USGS TOPO

DES. NO., 0100541

PUTNAM COUNTY

ROAD NO., S.R. 240

From 4.25 Miles E of US 231 to SR 75

Road Rehabilitation

SCALE - NTS

A-3

240

EXISTING
CURVE DATA
P.I. STA. 242+52.74 "A"
 $\Delta = 17^{\circ}59'51"$ RT.
R = 1,120.00'
T = 177.37'
L = 351.81'
E = 13.96'

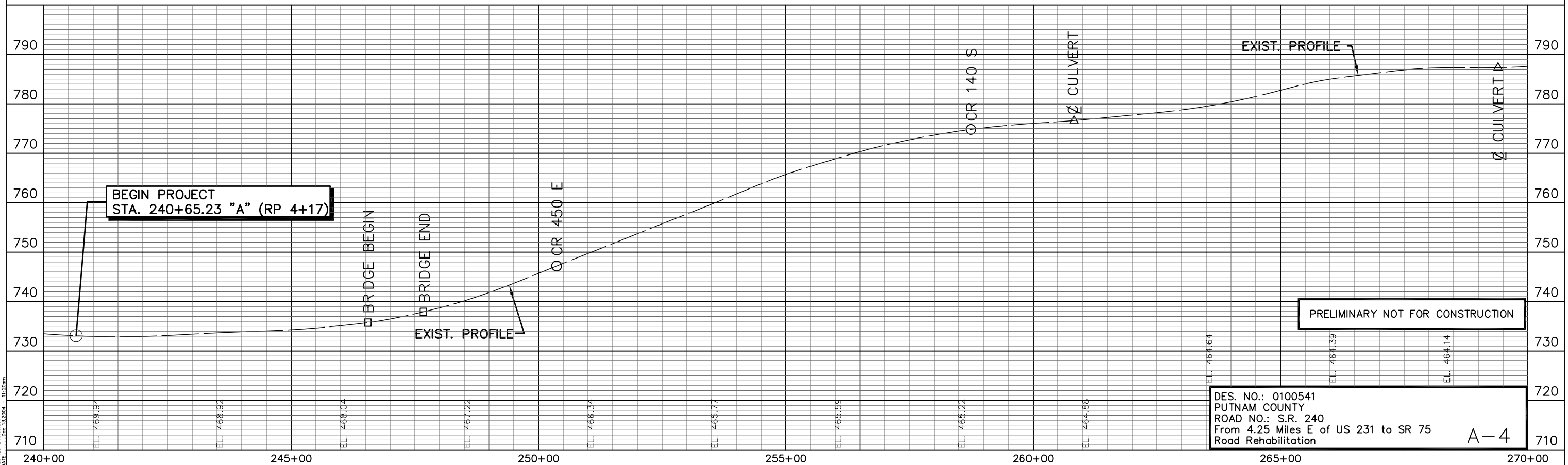
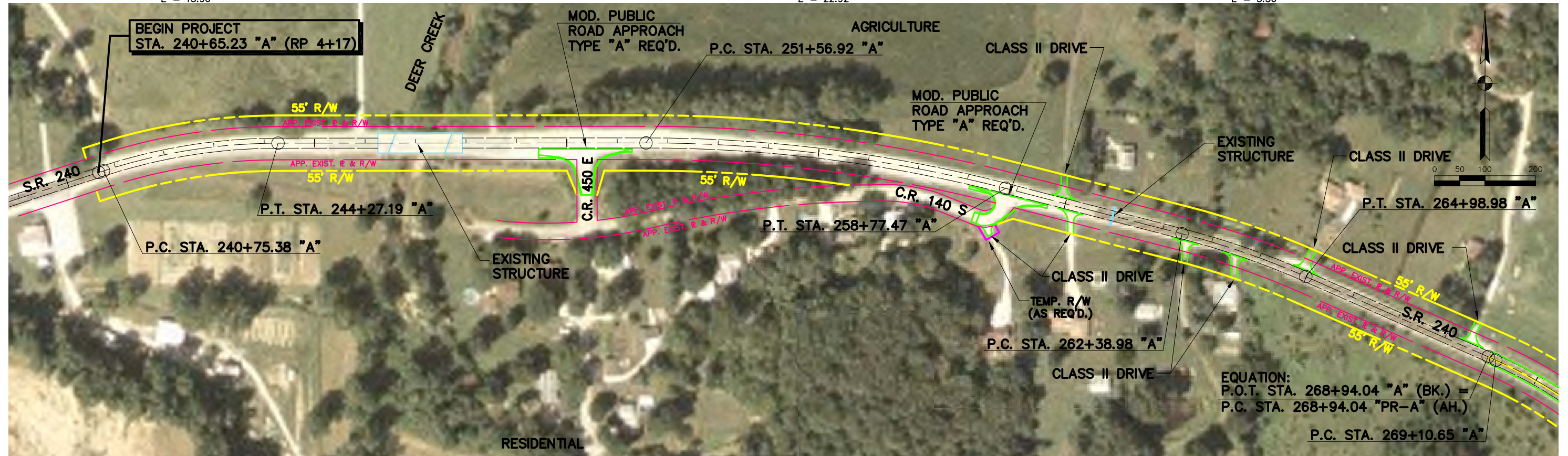
250

EXISTING
CURVE DATA
P.I. STA. 255+19.13 "A"
 $\Delta = 14^{\circ}29'09"$ RT.
R = 2,850.00'
T = 362.20'
L = 720.55'
E = 22.92'

260

EXISTING
CURVE DATA
P.I. STA. 263+69.27 "A"
 $\Delta = 9^{\circ}18'39"$ RT.
R = 1,600.00'
T = 130.29'
L = 260.00'
E = 5.30'

270



270

EXISTING
CURVE DATA
P.I. STA. 270+17.10 "A"
 $\Delta = 14^{\circ}01'52"$ RT.
R = 865.00'
T = 106.45'
L = 211.83'
E = 6.53'

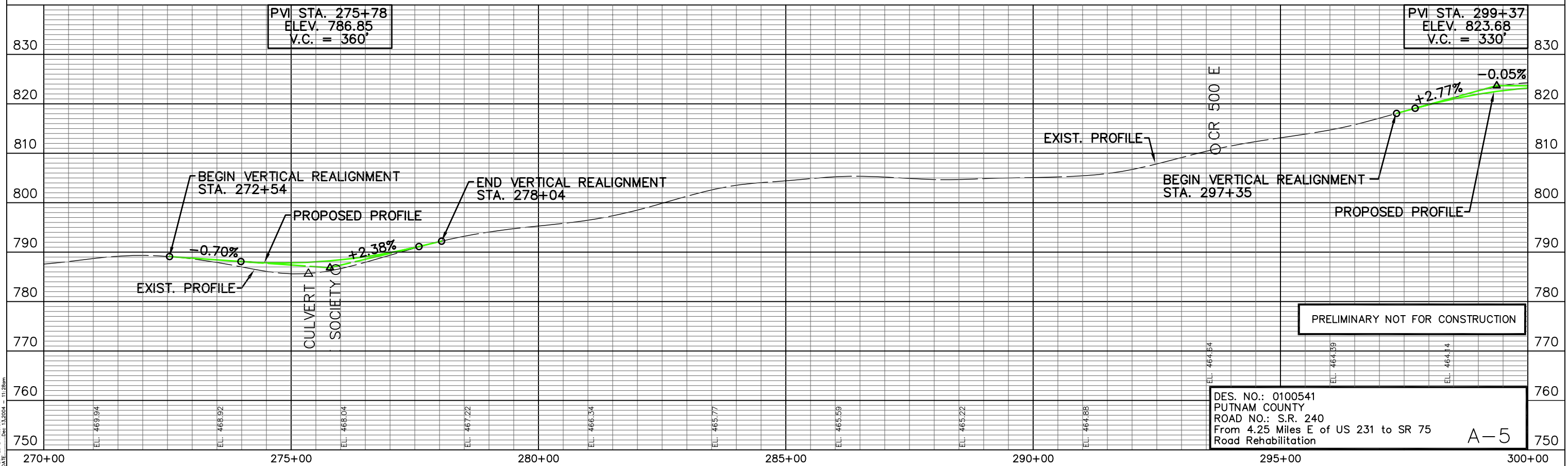
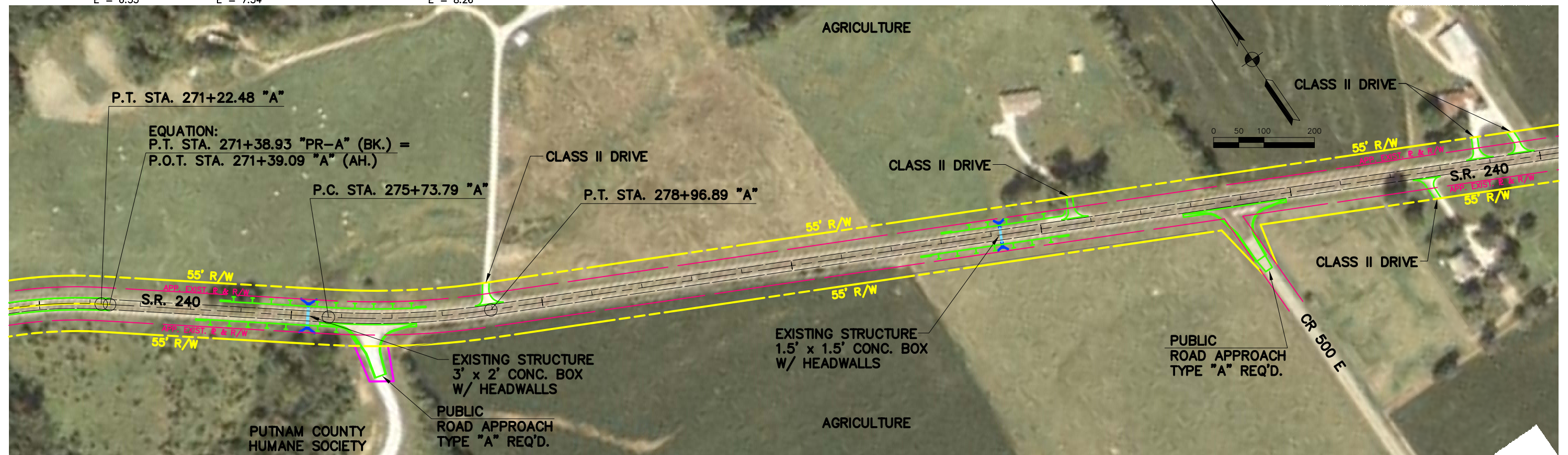
PROPOSED
CURVE DATA
P.I. STA. 270+17.10 "PR-A"
 $\Delta = 14^{\circ}01'52"$ RT.
R = 1,000.00'
T = 123.06'
L = 244.89'
E = 7.54'

280

EXISTING
CURVE DATA
P.I. STA. 277+35.84 "A"
 $\Delta = 11^{\circ}40'30"$ LT.
R = 1,585.00'
T = 162.05'
L = 322.97'
E = 8.26'

290

300



DIRECTORY: E:\2020\022023\Drawings\ L7SCALE:100 DIMSCALE:1
FILE:.....022222 Putnam.dwg
DATE: 12/20/2024 11:28am
DRAWN BY: rld
CHECKED BY: rld

300

EXISTING
CURVE DATA
P.I. STA. 308+29.19 "A"
 $\Delta = 26^{\circ}13'56"$ LT.
R = 550.00'
T = 128.15'
L = 251.81'
E = 14.73'

PROPOSED
CURVE DATA
P.I. STA. 308+29.19 "PR-A"
 $\Delta = 26^{\circ}13'56"$ LT.
R = 1,000.00'
T = 233.00'
L = 457.84'
E = 26.79'

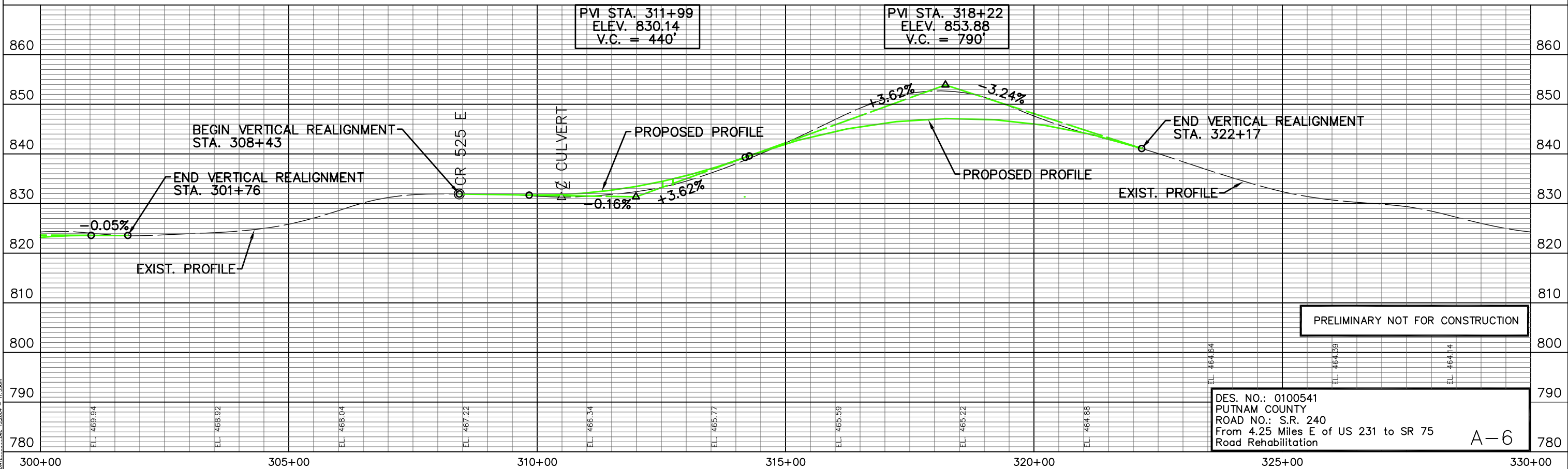
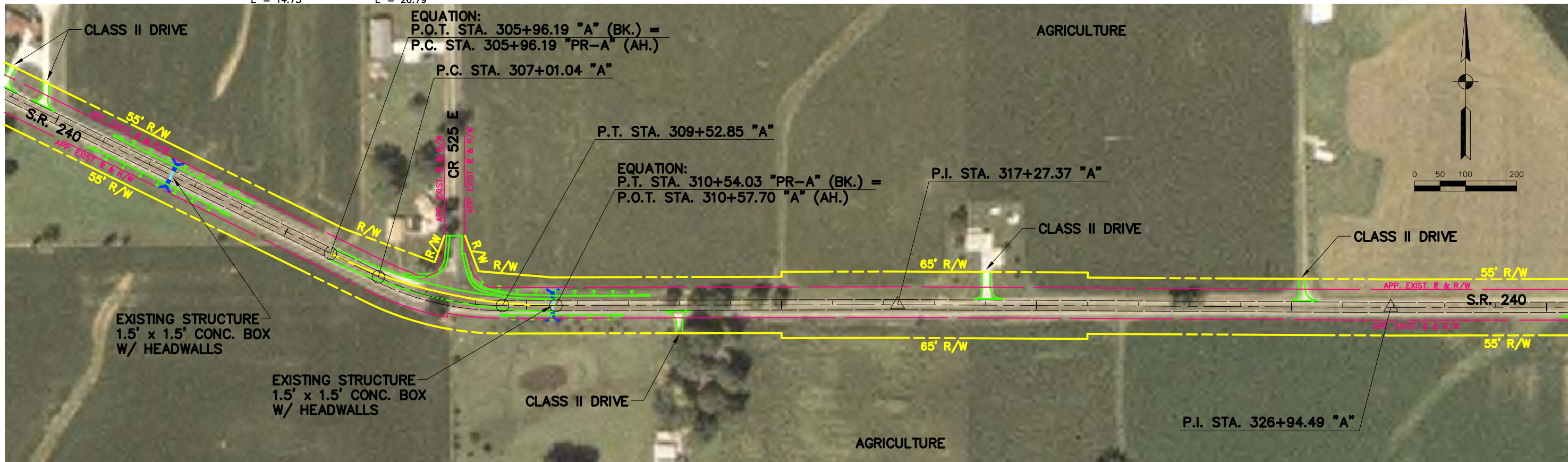
310

EXISTING
CURVE DATA
P.I. STA. 317+27.37 "A"
 $\Delta = 0^{\circ}26'45"$ RT.
(NO CURVE RUN)

320

EXISTING
CURVE DATA
P.I. STA. 326+94.49 "A"
 $\Delta = 0^{\circ}24'05"$ LT.
(NO CURVE RUN)

330



330

EXISTING
CURVE DATA
P.I. STA. 334+90.08 "A"
 $\Delta = 5'47'01"$ RT.
R = 1,750.00'
T = 88.40'
L = 176.65'
E = 2.23'

EXISTING
CURVE DATA
P.I. STA. 337+04.78 "A"
 $\Delta = 0'28'01"$ RT.
(NO CURVE RUN)

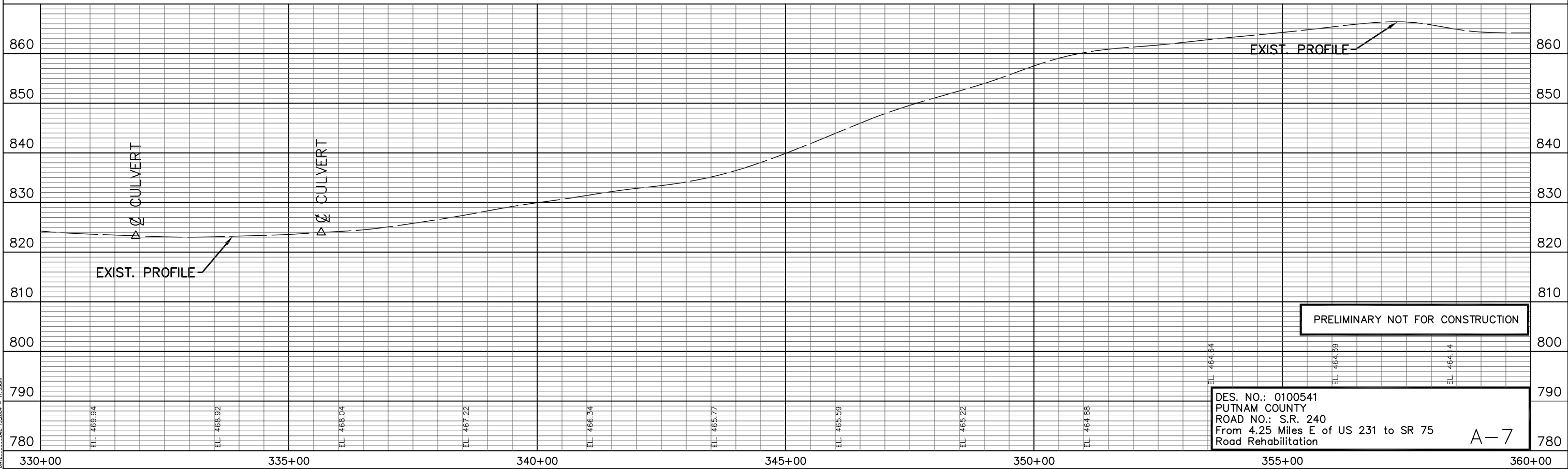
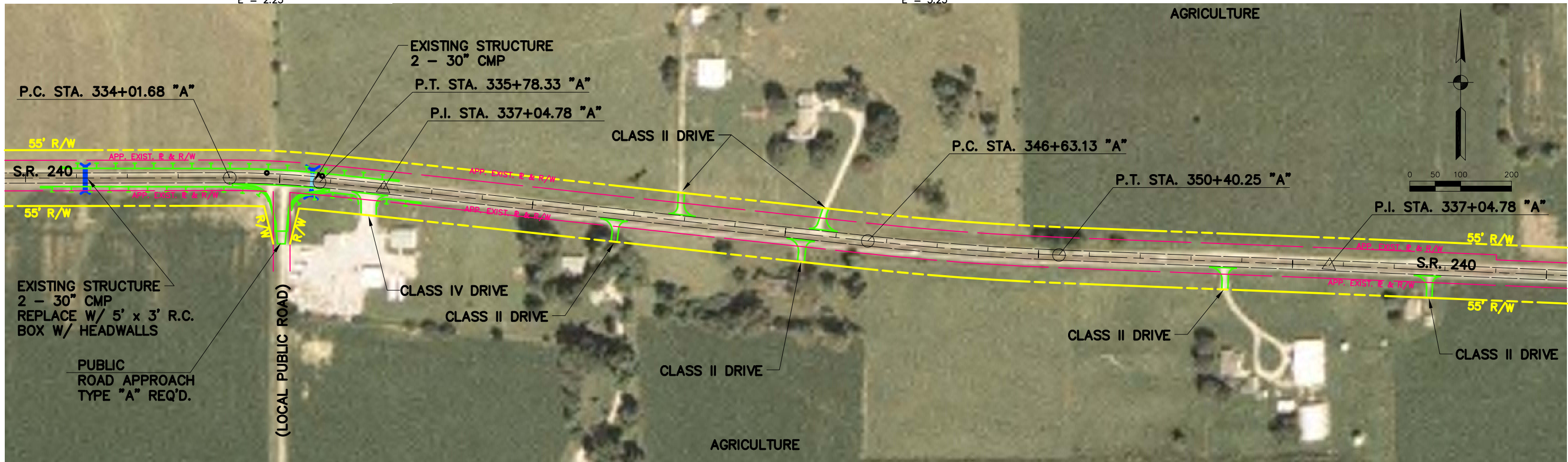
340

EXISTING
CURVE DATA
P.I. STA. 348+51.77 "A"
 $\Delta = 3'55'43"$ LT.
R = 5,500.00'
T = 188.64'
L = 377.12'
E = 3.23'

350

EXISTING
CURVE DATA
P.I. STA. 355+72.23 "A"
 $\Delta = 0'09'59"$ RT.
(NO CURVE RUN)

360

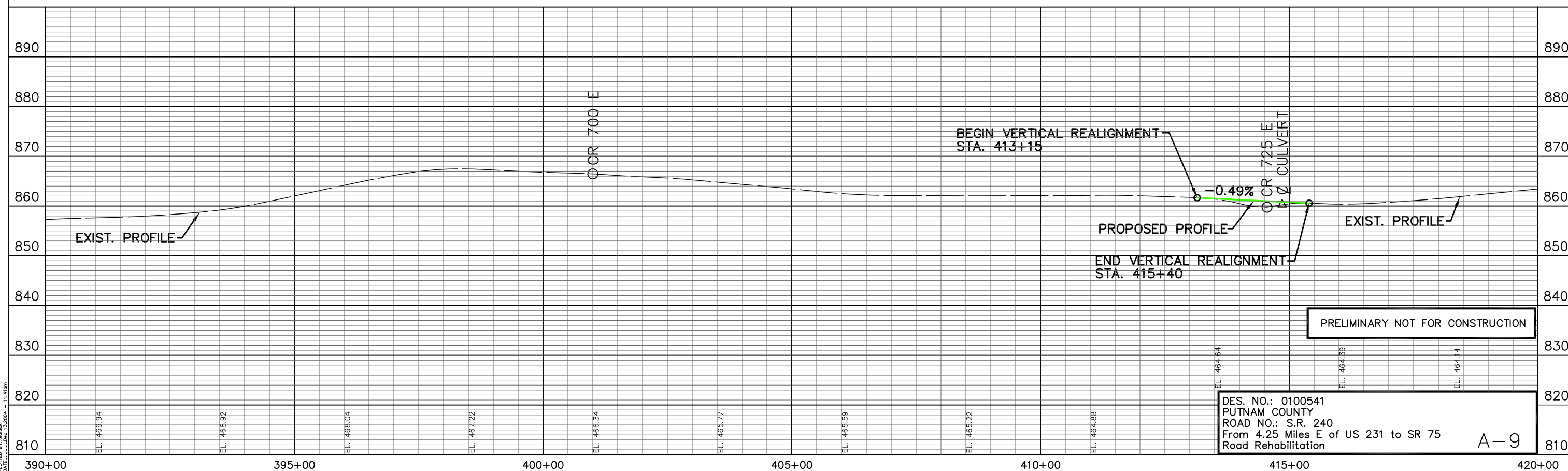
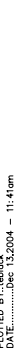


390

PROPOSED CURVE DATA



420



420

EXISTING
CURVE DATA
P.I. STA. 425+68.91 "A"
 $\Delta = 0^{\circ}12'125"$ RT.
(NO CURVE RUN)

430

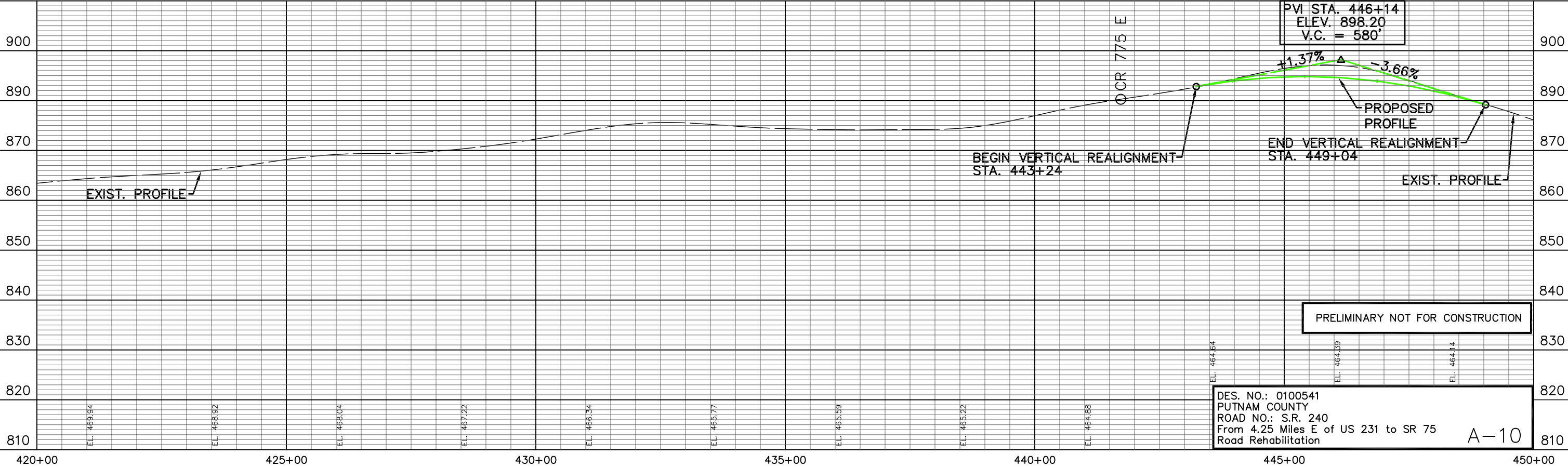
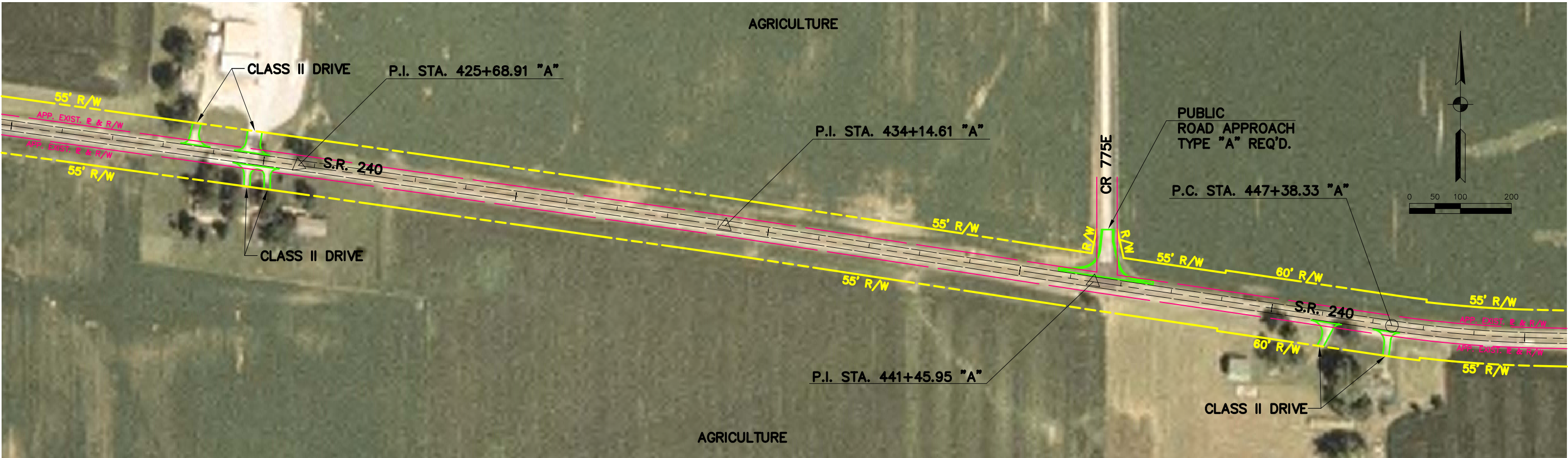
EXISTING
CURVE DATA
P.I. STA. 434+14.61 "A"
 $\Delta = 0^{\circ}36'26"$ RT.
(NO CURVE RUN)

440

EXISTING
CURVE DATA
P.I. STA. 441+45.95 "A"
 $\Delta = 0^{\circ}16'46"$ LT.
(NO CURVE RUN)

EXISTING
CURVE DATA
P.I. STA. 448+77.69 "A"
 $\Delta = 7^{\circ}05'18"$ LT.
R = 2,250.00'
T = 139.36'
L = 278.36'
E = 4.31'

450



DIRECTORY: E:\2020\022023\Drawings\ LSCALE: 100 DIMSCALE: 1
FILE: 022023 Putn.dwg
DATE: 02/20/2024 11:48am
DRAWN BY: [redacted]

450

EXISTING
CURVE DATA
P.I. STA. 455+67.66 "A"
 $\Delta = 211'21"$ LT.
R = 3,500.00'
T = 66.88'
L = 133.74'
E = 0.64'

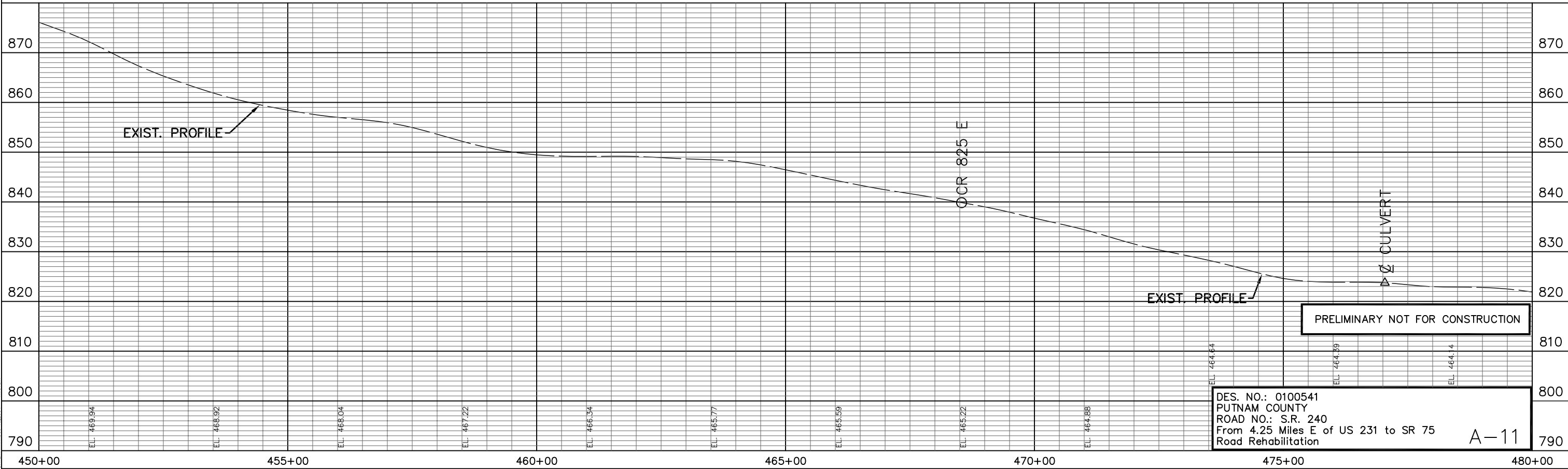
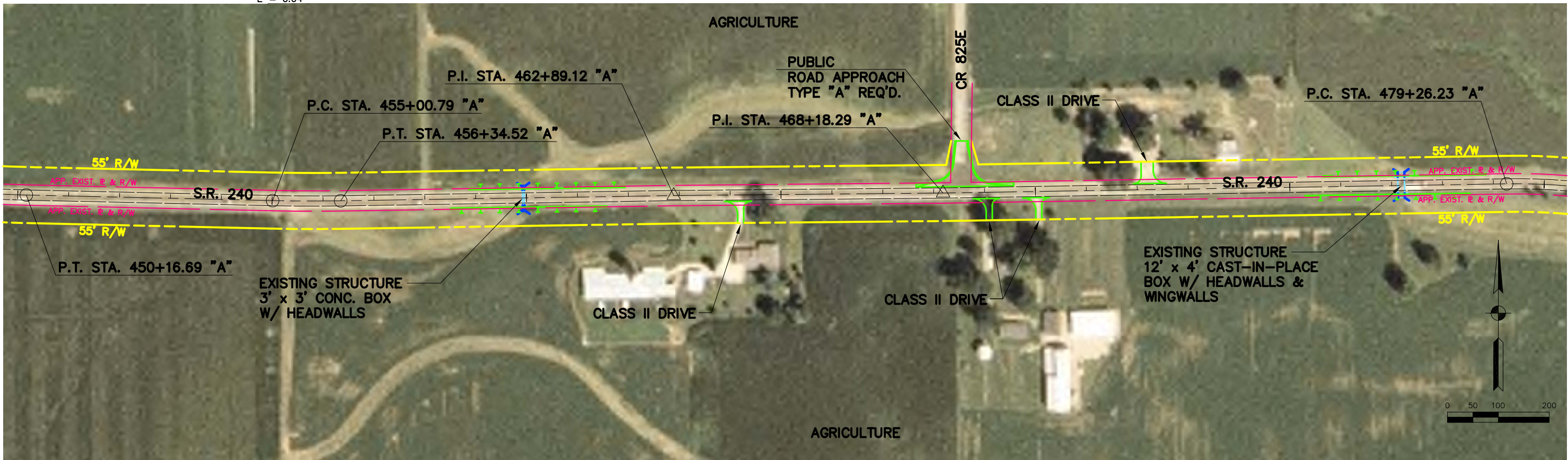
460

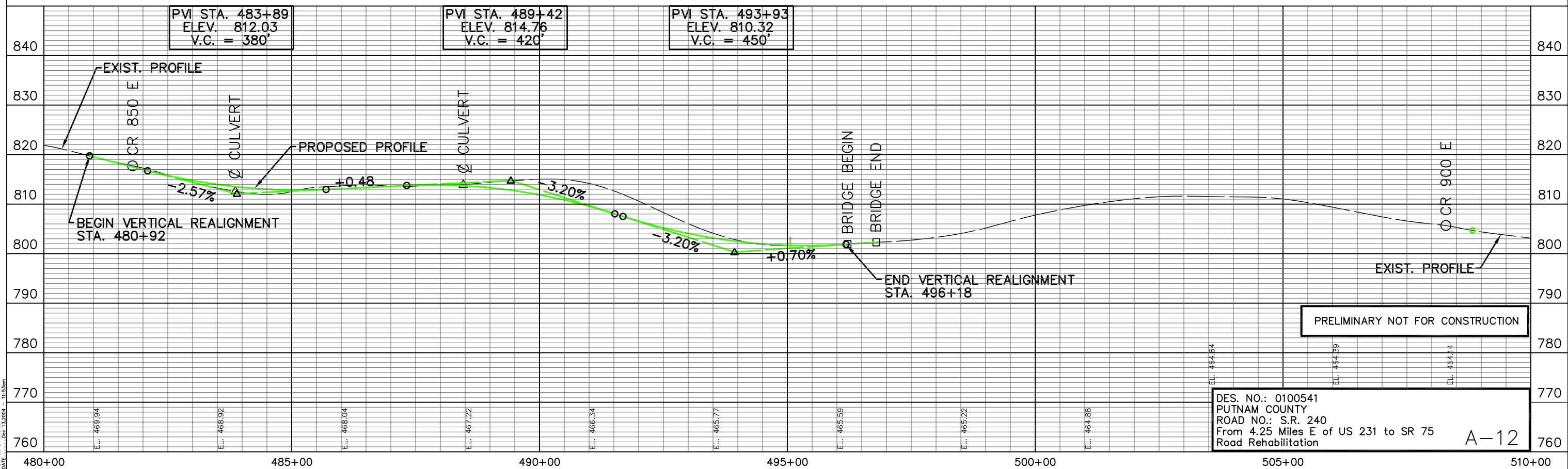
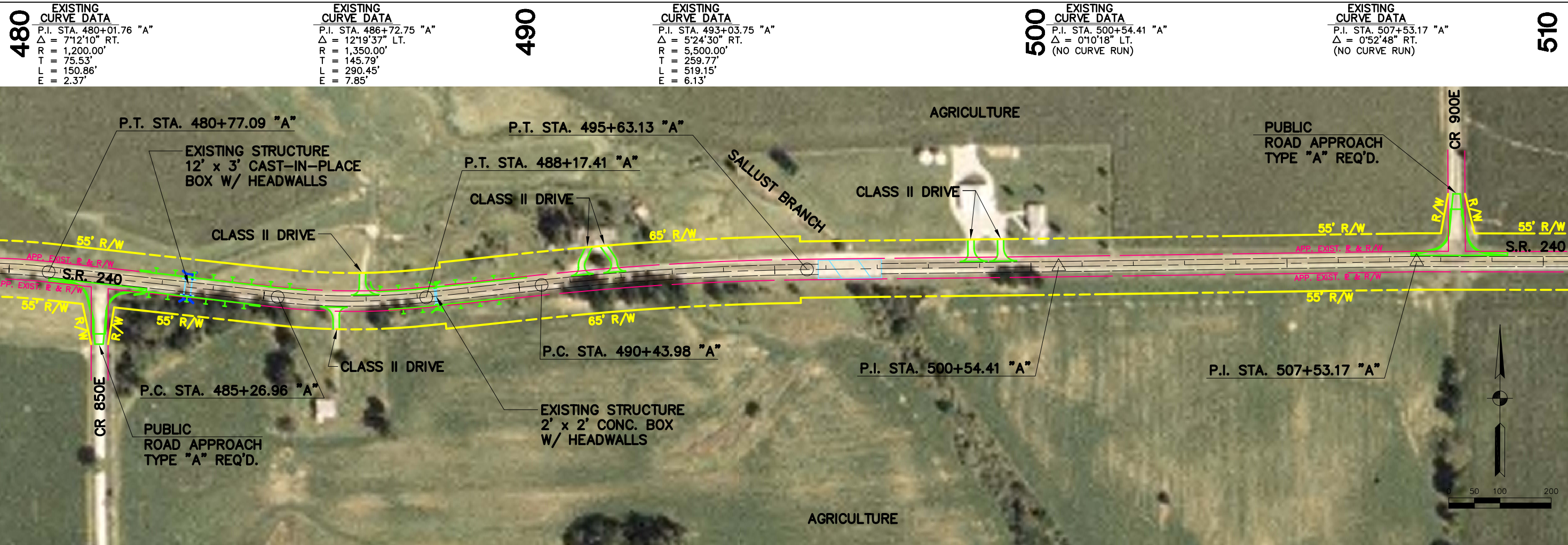
EXISTING
CURVE DATA
P.I. STA. 462+89.12 "A"
 $\Delta = 0'21'16"$ RT.
(NO CURVE RUN)

EXISTING
CURVE DATA
P.I. STA. 468+18.29 "A"
 $\Delta = 0'23'14"$ LT.
(NO CURVE RUN)

470

480





510

EXISTING
CURVE DATA
P.I. STA. 511+41.43 "A"
Δ = 0°12'12" RT.
(NO CURVE RUN)

EXISTING
CURVE DATA
P.I. STA. 517+42.00 "A"
Δ = 0°30'20" LT.
(NO CURVE RUN)

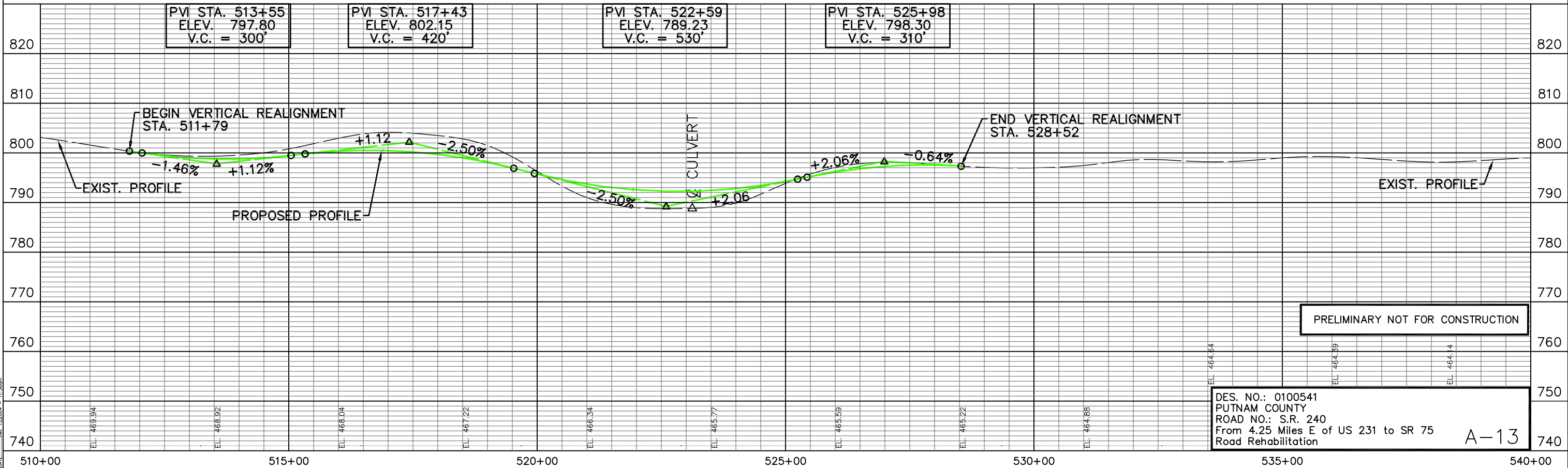
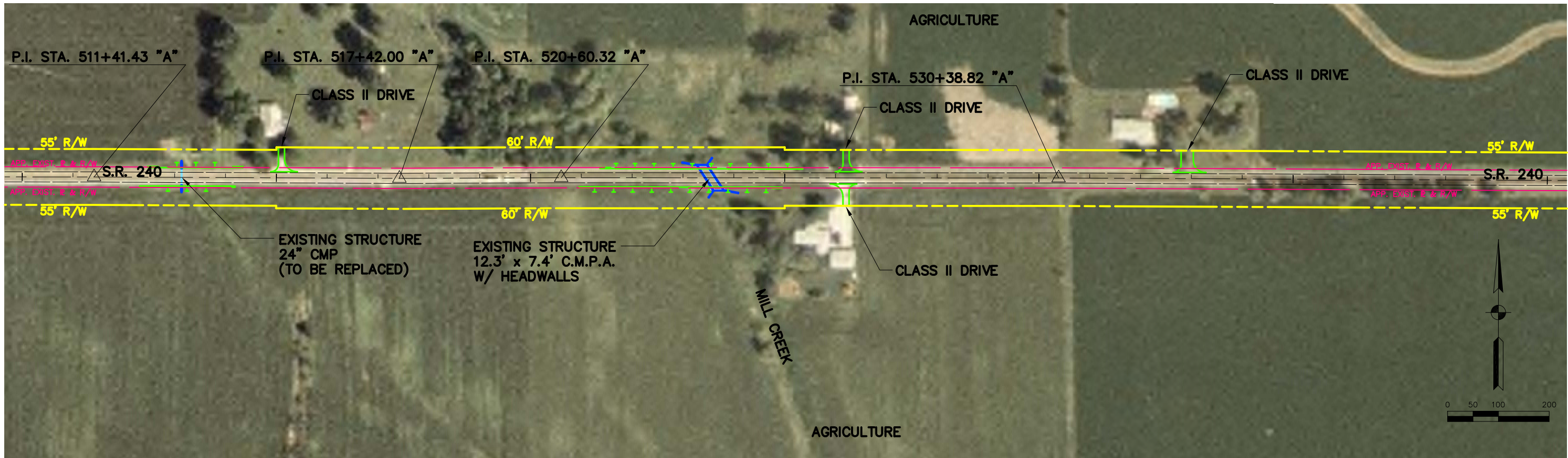
520

EXISTING
CURVE DATA
P.I. STA. 520+60.32 "A"
Δ = 0°16'44" RT.
(NO CURVE RUN)

530

EXISTING
CURVE DATA
P.I. STA. 530+38.82 "A"
Δ = 0°14'59" RT.
(NO CURVE RUN)

540



540

EXISTING
CURVE DATA
P.I. STA. 540+50.60 "A"
 $\Delta = 0^{\circ}03'06"$ LT.
(NO CURVE RUN)

EXISTING
CURVE DATA
P.I. STA. 546+16.10 "A"
 $\Delta = 0^{\circ}09'06"$ LT.
(NO CURVE RUN)

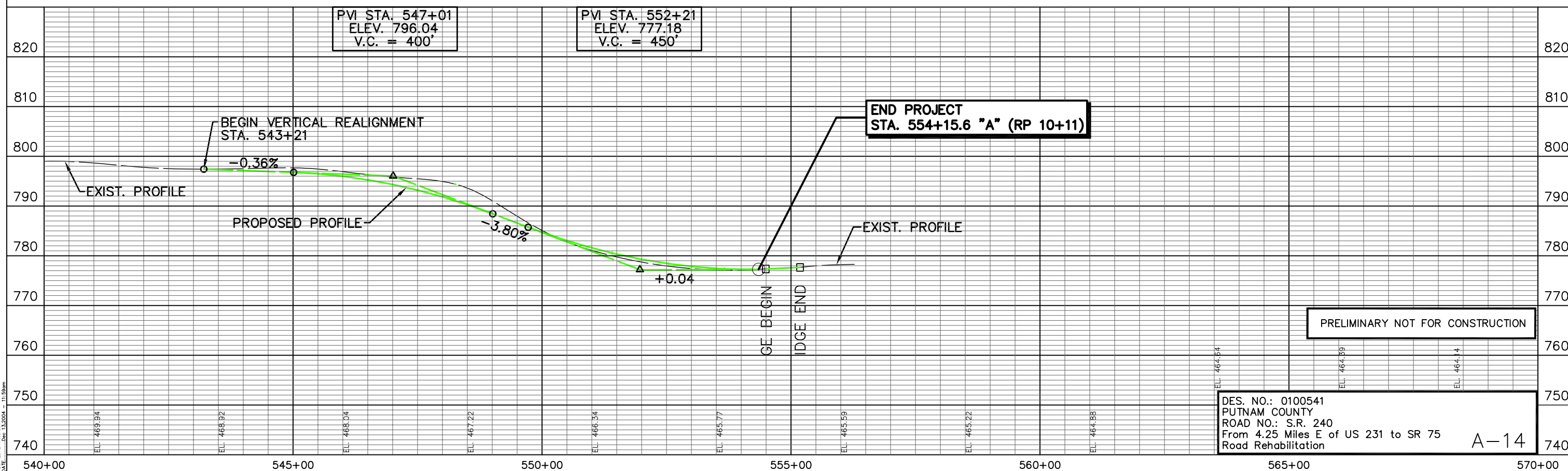
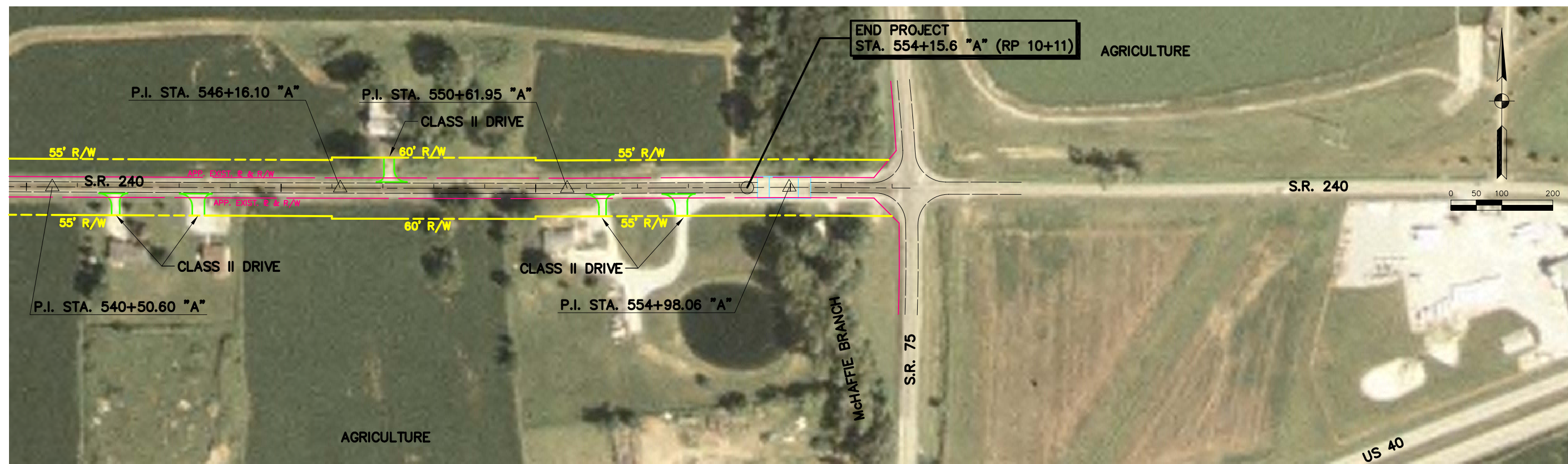
550

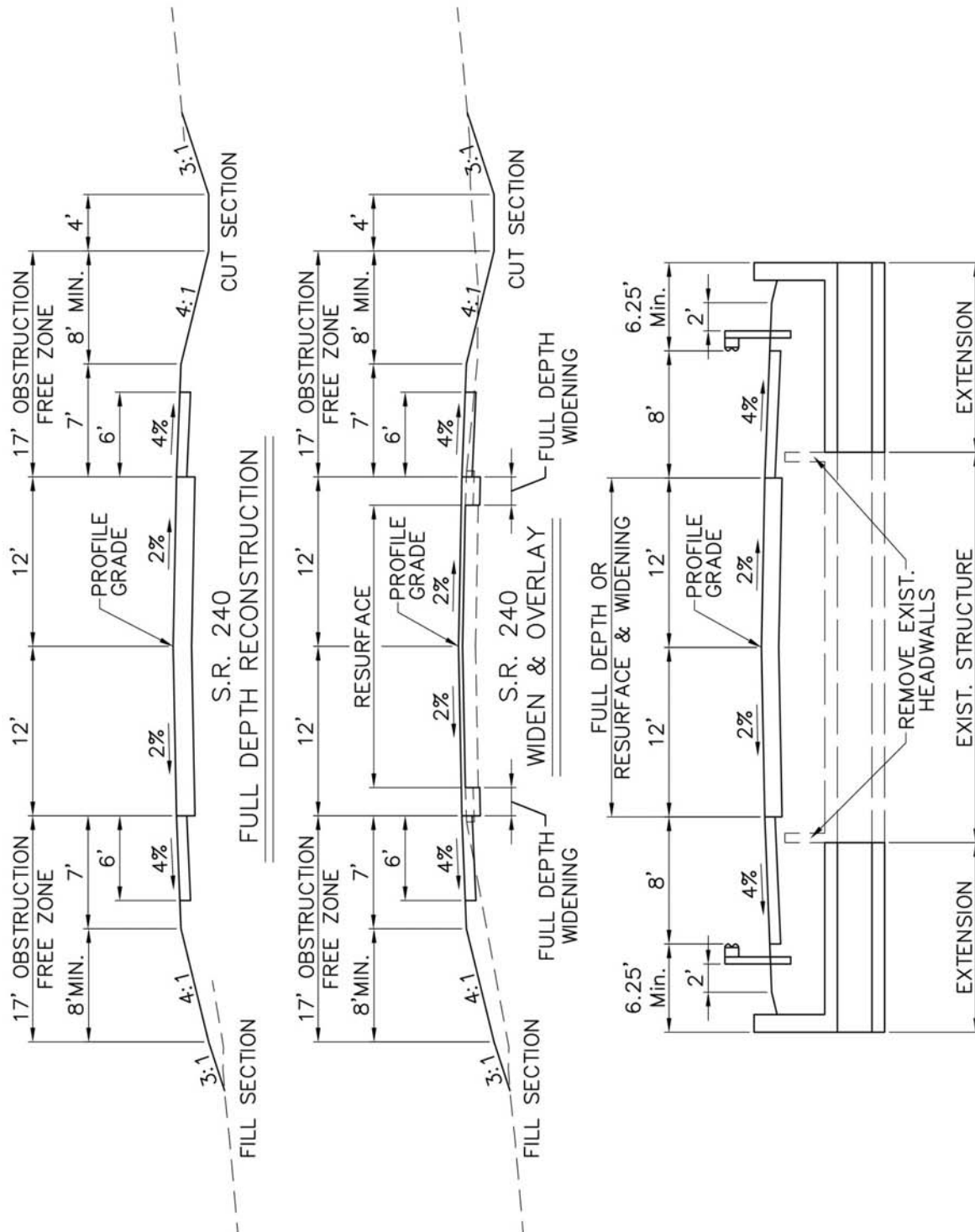
EXISTING
CURVE DATA
P.I. STA. 550+61.95 "A"
 $\Delta = 0^{\circ}22'07"$ LT.
(NO CURVE RUN)

EXISTING
CURVE DATA
P.I. STA. 554+98.06 "A"
 $\Delta = 0^{\circ}39'54"$ RT.
(NO CURVE RUN)

560

570





**Ground Photos
SR 240 Intersection**



SR 240 at CR 140S, looking southwest



CR 500E, looking southeast



SR 240 west of CR 525E, looking west



SR 240 at CR 140S, looking southwest



SR 240 at CR 650E, looking west



SR 240 at CR 650E, looking east



SR 240 at CR 700E, looking west



SR 240 at CR 700E, looking east



SR 240 at CR 725E, looking west



SR 240 at CR 725E, looking east



SR 240 at CR 775E, looking west



SR 240 at CR 775, looking east



SR 240 at CR 825E, looking west



SR 240 at CR 825E, looking east



SR 240 at CR 850E, looking west



SR 240 at CR 850E, looking east



SR 240 at CR 900E, looking west



SR 240 at CR 900E, looking east

Ground Photos
SR 240 Small Drainage Structures



Sta. 275+35 34'x3'x2' concrete box, looking north



Sta. 289+20 25.5'x1.5'x1.5' concrete box,
looking southwest



Sta. 302+50 24'x1.5'x1.5' concrete box,
looking south



Sta. 331+15 North end of twin 35.5'x5'x30"
CMP looking southwest. Note crushed pipe.



Sta. 331+15 South end of twin 35.5'x30" CMP,
looking northwest



Sta. 335+45 twin 34'x30" CMP,
looking northwest



Sta. 366+85 26'x2'x2' concrete box, looking north



Sta. 366+85 26'x2'x2' concrete box,
looking southeast



Sta. 373+50 25'x24"x18" concrete box,
looking north



Sta. 415+65 South end of 30'x12'x3' CIP box,
looking west



Sta. 415+65 North end of 24'12'x3' CIP box,
looking southwest



Sta. 459+90 28.5'x3'x3' concrete box,
looking northeast



Sta. 483+50 30.5'x12'x3' CIP box,
looking northwest



Sta. 477+15 30.5'x12'x4' CIP box with
wingwalls, looking southwest



Sta. 488+30 30'x.2'x2' concrete box,
looking west



Sta. 513+10 North end of 33'x24" CMP with
crushed end, looking southwest



Sta. 513+10 South end of 33'x24" CMP,
Looking north



Sta. 523+00 South end of 58'x12.3'x7.5' CMP
arch, looking northwest

INDIANAPOLIS, INDIANA 46204-2249
INTER-OFFICE COMMUNICATION

Writer's Direct Line

September 29, 2003

(317) 233-1057 **Voice**
(317) 232-5478 Fax

TO: Brad Steckler
Engineering Assessment

FROM: Beckie Black *RLB*
Senior Forecast Technician

RE: SR 240, Putnam County, DES # 0100541

Traffic counts were performed for the above referenced project in September, 2003. The results of these counts show that most of the intersections requested have a low average 24-hour volume. These volumes are listed below:

CR 525E = 422 vehicles
CR 650E = 243 vehicles
CR 700E = 282 vehicles
CR 725E = 458 vehicles
CR 800E = 159 vehicles
CR 825E = 171 vehicles
CR 850E = 49 vehicles
CR 900E = 157 vehicles

Design for roads with volumes this low should be adequately covered by standard intersection geometrics. We will provide turning movements for the CR 500E and the SR 75 intersections. Also, we will provide mainline volumes for SR 240 in the vicinity of CR 725E. If you wish to discuss this decision, please feel free to contact Scott MacArthur at (317) 233-1166.

RLB/rlb
cc: file

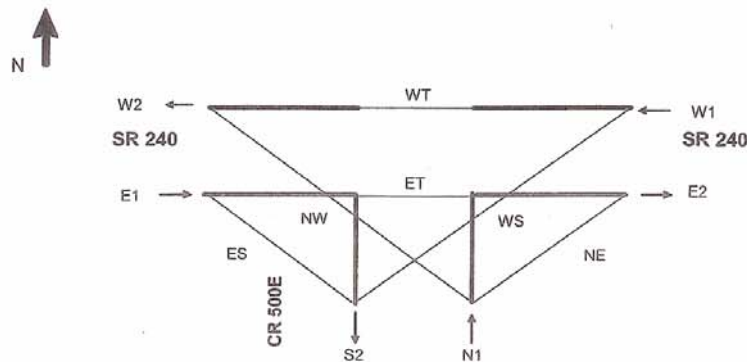
B-1

Table 1. Traffic Estimate Sheet of the Intersection of SR 240 and CR 500E

**Division of Roadway Management
Traffic Statistics Unit
Traffic Estimate Worksheet**

Des. No.: 0100541 Route: SR 240 County: Putnam

Simple Annual Growth Rate 2.80% from Year 2003 to Year 2013
 2.00% from Year 2013 to Year 2028



Movement	AADT					%DHV		%Commercial Vehicles		
	2003	2008	2013	2018	2028	AM	PM	AADT	AM	PM
N1	368	422	485	536	653	10%	8%	8%	9%	7%
S2	390	448	514	568	692	7%	16%	8%	8%	8%
E1	2,258	2,592	2,976	3,286	4,006	5%	10%	7%	7%	5%
W2	2,225	2,555	2,933	3,239	3,948	8%	9%	8%	8%	5%
W1	2,095	2,405	2,761	3,049	3,716	8%	9%	9%	8%	6%
E2	2,105	2,417	2,775	3,064	3,735	6%	9%	8%	7%	4%
NE	116	133	152	168	205	11%	8%	13%	9%	8%
NW	252	290	333	367	448	9%	8%	5%	9%	6%
ES	268	308	353	390	475	5%	15%	5%	7%	7%
ET	1,990	2,285	2,623	2,896	3,530	5%	9%	7%	7%	4%
WS	122	140	161	178	216	9%	16%	15%	8%	11%
WT	1,973	2,265	2,600	2,871	3,500	8%	9%	9%	7%	5%

Table 2. Mainline Traffic Volumes for SR 240 in the Vicinity of CR 725E

Division of Roadway Management
Traffic Statistics Unit
Traffic Estimate Worksheet

Des. No.: 0100541

Route: SR 240

County: Putnam

Simple Annual Growth Rate 2.80% from Year 2003 to Year 2013
 2.00% from Year 2013 to Year 2028

Direction	AADT					%DHV		%Commercial Vehicles		
	2003	2008	2013	2018	2028	AM	PM	AADT	AM	PM
Eastbound	1,952	2,241	2,573	2,841	3,463	8%	8%	7%	5%	2%
Westbound	1,999	2,295	2,635	2,909	3,546	5%	10%	8%	6%	5%

Table 3. Traffic Estimate Sheet of the Intersection of SR 240 and SR 75

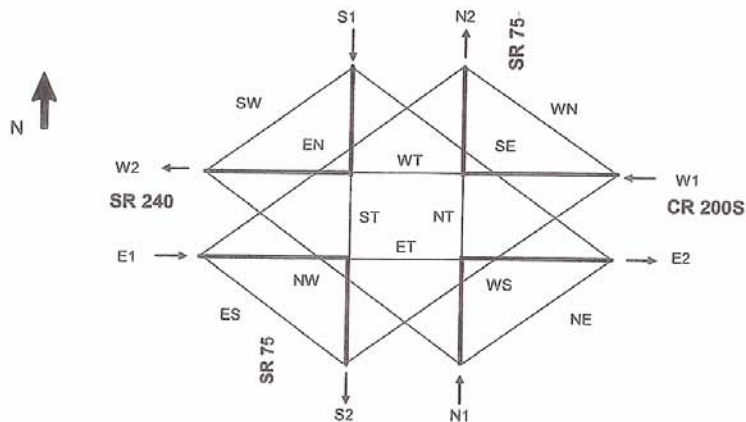
Division of Roadway Management
Traffic Statistics Unit
Traffic Estimate Worksheet

Des. No.: 0100541

Route: SR 240

County: Putnam

Simple Annual Growth Rate 2.80% from Year 2003 to Year 2013
2.00% from Year 2013 to Year 2028



Movement	AADT					%DHV		%Commercial Vehicles		
	2003	2008	2013	2018	2028	AM	PM	AADT	AM	PM
N1	880	1,010	1,160	1,281	1,561	6%	9%	13%	14%	11%
S2	1,167	1,340	1,538	1,698	2,070	8%	8%	14%	10%	8%
S1	1,545	1,774	2,036	2,248	2,741	8%	8%	9%	8%	7%
N2	1,567	1,799	2,065	2,280	2,780	5%	10%	9%	8%	7%
E1	1,797	2,063	2,369	2,615	3,188	8%	7%	7%	3%	5%
W2	1,858	2,133	2,449	2,704	3,296	5%	11%	8%	9%	4%
W1	1,699	1,951	2,239	2,472	3,014	4%	12%	7%	6%	2%
E2	1,329	1,525	1,751	1,934	2,357	10%	7%	3%	2%	2%
NE	18	20	23	26	31	12%	8%	14%	15%	24%
NW	189	217	250	276	336	6%	10%	14%	18%	10%
NT	673	773	887	979	1,194	6%	8%	13%	13%	10%
SE	183	211	242	267	325	11%	8%	4%	4%	5%
SW	443	509	584	645	786	6%	8%	9%	11%	10%
ST	918	1,054	1,210	1,336	1,629	8%	7%	10%	9%	6%
ES	218	250	287	317	387	6%	7%	29%	16%	18%
EN	451	518	595	657	801	5%	9%	8%	4%	8%
ET	1,128	1,295	1,486	1,641	2,000	10%	7%	3%	2%	1%
WN	443	508	584	644	786	4%	13%	4%	3%	2%
WS	31	35	40	45	54	6%	26%	24%	17%	3%
WT	1,226	1,407	1,615	1,783	2,174	4%	12%	7%	6%	2%

B-4

INDIANA DEPARTMENT OF TRANSPORTATION
INDIANAPOLIS, INDIANA 46204-2249
INTER-DEPARTMENT COMMUNICATION

March 20, 2003

MEMORANDUM

TO: Brad Steckler
Preliminary Engineering

FROM: Christopher J. Hostetler, E.I.T. *CH* *WA*
Hydraulic Engineer Trainee

SUBJECT: PRELIMINARY HYDRAULIC REVIEW
Road: SR 240
Des. #: 0100541
Project: STP-030-3()
Location: 4.17 mi East of US 231 to SR 75
Existing Type: Includes 12 sites

Site #1

The existing 2.4 foot wide by 2.3 foot high cast in place concrete box is adequate to handle the 100-year flood event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure:

Location: 4.17 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	41.3	acres
Approximate Q100 Discharge	=	29.3	cfs
Approximate Q100 Depth	=	2.82	feet
Approximate Gross Waterway Opening below Q-100	=	7.14	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a corrugated metal pipe no less than 42 inches in diameter. A second alternative would be a 2 foot high by 3 foot wide concrete box with wing walls. The existing structure is in need of Class I rip-rap. Class II rip-rap will be required for the 2 foot by 3 foot concrete box. Revetment rip-rap will be required for the corrugated metal pipe.

Site #2

The existing twin 30 inch corrugated metal pipe is adequate to handle the 100-year flood event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure.

Location: 5.17 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	11.4	acres
Approximate Q100 Discharge	=	20.2	cfs
Approximate Q100 Depth	=	1.63	feet
Approximate Gross Waterway Opening below Q-100	=	6.52	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a 4 foot wide by 2 foot high reinforced concrete box with wing walls. Class I rip-rap is required. Due to cover requirements, corrugated metal pipe is not an option.

Site #3

The existing twin 30 inch corrugated metal pipe is adequate to handle the 100-year flood event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure.

Location: 5.31 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	31.3	acres
Approximate Q100 Discharge	=	47.3	cfs
Approximate Q100 Depth	=	1.09	feet
Approximate Gross Waterway Opening below Q-100	=	11.85	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a 5 foot wide by 3 foot high reinforced concrete box with concrete wingwalls. The structure must be placed 0.5 feet below the invert elevation of the existing culvert to allow for proper cover. Class I rip-rap will be required. Due to cover requirements, corrugated metal pipe is not an option.

Site #4

The existing 2 foot by 2 foot reinforced concrete box is not adequate to handle the 100-year storm event. The following recommendations are made for the hydraulic design of this structure.

Location: 5.91 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	95.4	acres
Approximate Q100 Discharge	=	99.1	cfs
Approximate Q100 Depth	=	1.50	feet
Approximate Gross Waterway Opening below Q-100	=	25.92	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a 12 foot wide by 3 foot high reinforced concrete box with concrete wingwalls. Class II rip-rap will be required. Due to cover requirements, corrugated metal pipe is not an option.

Site #5

Location: 6.05 miles East of US 231 on SR 240

The existing bridge was recently rehabilitated. If preliminary analysis is necessary, please contact the hydraulics section.

Site #6

The existing 12.5 foot wide by 2.2 foot high reinforced concrete box is adequate to handle the 100-year storm event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure.

Location: 6.81 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	66.9	acres
Approximate Q100 Discharge	=	62.4	cfs
Approximate Q100 Depth	=	1.15	feet
Approximate Gross Waterway Opening below Q-100	=	19.5	sf
Approximate Grade Raise	=	0.5	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a 13 foot wide by 3 foot high reinforced concrete box with concrete wingwalls. The structure must be placed 1 foot lower than the invert elevation of the existing structure. A grade raise of 0.5 feet is required to provide adequate cover. Class I rip-rap will be required. Due to lack of cover, corrugated metal pipe is not an option.

Site #7

The existing 2.5 foot wide by 1.7 foot high precast concrete box is adequate to handle the 100-year storm event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure.

Location: 7.66 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	11.4	acres
Approximate Q100 Discharge	=	15.5	cfs
Approximate Q100 Depth	=	0.20	feet
Approximate Gross Waterway Opening below Q-100	=	4.30	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a corrugated metal pipe no less than 30 inches in diameter. Class I rip-rap will be required. A second alternative would be a 3 foot wide by 2 foot high reinforced concrete box with concrete wingwalls. Class I rip-rap will be required for this option.

Site #8

The existing 12 foot wide by 4 foot high reinforced concrete box is adequate to handle the 100-year storm event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure.

Location: 7.94 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	56.9	acres
Approximate Q100 Discharge	=	60.5	cfs
Approximate Q100 Depth	=	1.04	feet
Approximate Gross Waterway Opening below Q-100	=	19.11	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a 13 foot wide by 3 foot high reinforced concrete box with concrete wingwalls. Class I rip-rap will be required. Due to cover requirements, corrugated metal pipe is not an option.

Site #9

The existing 12 foot wide by 3 foot high reinforced concrete box is adequate to handle the 100-year storm event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure.

Location: 8.08 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	72.6	acres
Approximate Q100 Discharge	=	67.7	cfs
Approximate Q100 Depth	=	1.22	feet
Approximate Gross Waterway Opening below Q-100	=	20.54	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a 13 foot wide by 3 foot high reinforced concrete box with concrete wingwalls. The structure must be placed one foot lower than the existing structure to provide adequate cover. Class I rip-rap will be required. Due to cover requirements, corrugated metal pipe is not an option.

Site #10

Location: 8.42 miles East of US 231 on Sr 240

The existing bridge was recently rehabilitated. If preliminary analysis is necessary, please contact the hydraulics section.

Site #11

The existing 12 foot wide by 7.5 foot high corrugated metal pipe arch is adequate to handle the 100-year storm event. If replacement is still desired, the following recommendations are made for the hydraulic design of this structure.

Location: 8.85 miles East of US 231 on SR 240

Proposed:

Approximate Drainage Area	=	548.0	acres
Approximate Q100 Discharge	=	700	cfs
Approximate Q100 Depth	=	2.93	feet
Approximate Gross Waterway Opening below Q-100	=	97.44	sf
Approximate Grade Raise	=	0.0	feet

Discussion of Structure Sizing:

The proposed structure size, based on field elevation estimates, is a 16 foot wide by 6 foot high reinforced concrete box with concrete wingwalls. Class II rip-rap will be required. Due to cover requirements, corrugated metal pipe is not an option.

Site #12

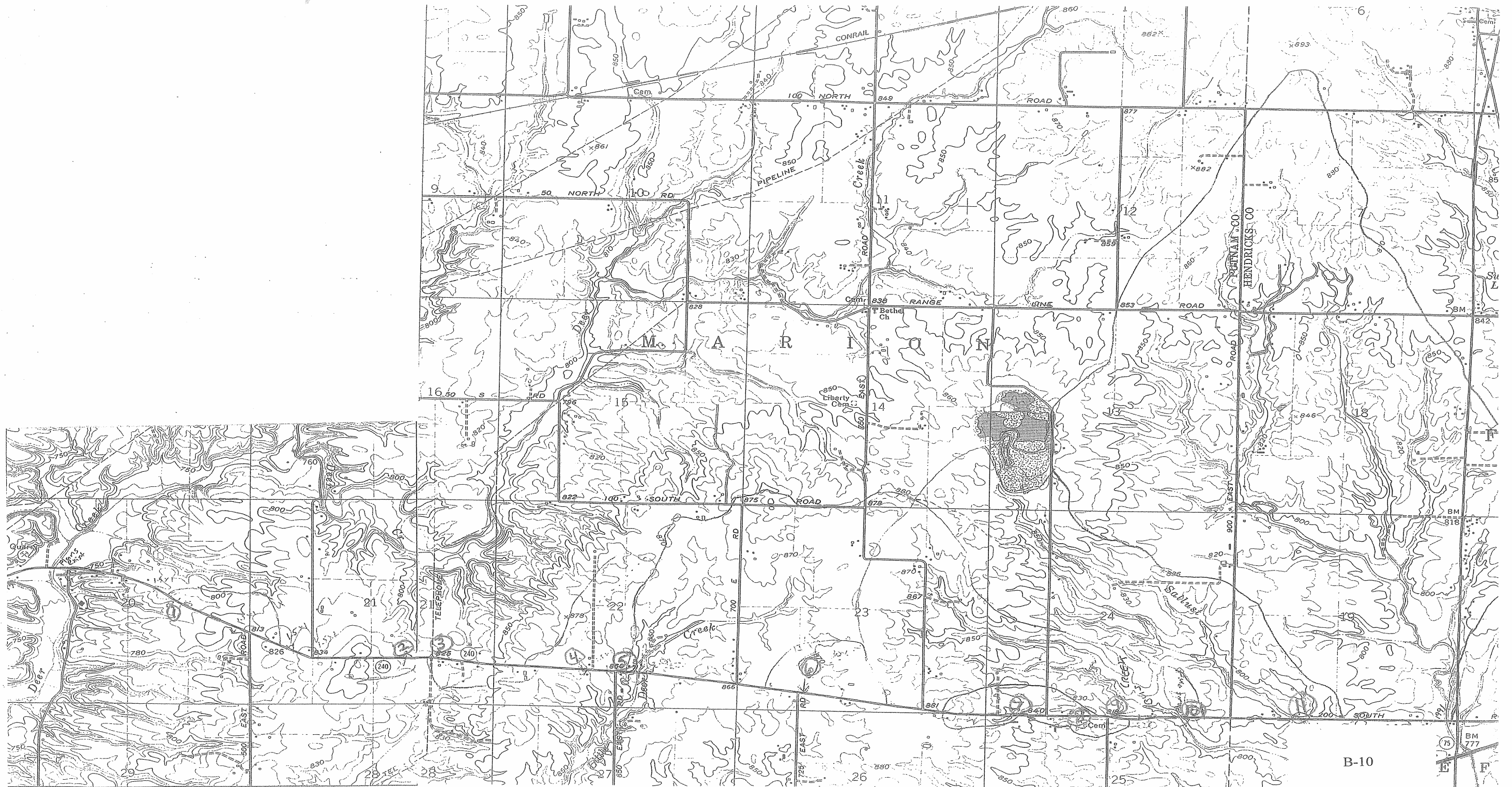
Location: 9.46 miles East of US 231 on SR 240

The existing bridge was built in 1991 and is too new to replace.

If you have any questions or comments, please contact me at (317) 232-5332.

CJH

cc: File (2)





Indiana Department of Transportation

Materials and Tests Division

120 South Shortridge Road P.O. Box 19389

Indianapolis, Indiana 46219-0389

Phone: (317) 232-5280 Fax: (317) 356-9351

October 31, 2002

MEMORANDUM

TO: Mr. Steve Dommer
VS Engineering, Inc.
4275 North High School Road
Indianapolis, IN 46254

THRU: Mr. David H. Andrews 
Materials Engineer

FROM: Mr. Kumar P. Dave 
Pavement Design Engineer

RE: Preliminary Pavement Design

Des No: 0100541

Description: **SR 240 – Road Reconstruction**

From SR 75 to 9.6 km west of SR 75 in Putnam and Hendricks Counties.

A Preliminary Engineering Scoping Field Check was held on Monday, October 21, 2002. The 9.6 km long section of SR 240 extending west from its intersection with SR 75. Within the project limit the existing roadway has 10 feet wide travel lanes with 1 to 2 feet shoulders. Pavement record indicates that west half was originally asphalt constructed in 1945 and the east half was concrete constructed in 1928. The roadway was resurfaced 2 to 3 times and is in fair condition. The existing SR 240 within the project limit has many substandard vertical and horizontal curves and drainage structures. Also, some of the intersections have substandard site distance. As discussed during the field check considering widening of the mainline pavement, the possibility of reconstructing some areas due to changes in horizontal and vertical alignments, site distance corrections and some drainage structure improvements, it is recommended that the existing pavement should be reconstructed.

For preliminary pavement design for a new pavement use 350 +/- 50 mm of pavement. The final pavement type and thickness will be determined after completion of the geotechnical investigation and traffic data submitted.

KPD
File

Rec'd 11-19-02

To: Brad L Steckler, Manager
INDOT Engineering Assessment Section

Thru: Sanjay B. Patel
Project Manager
VS Engineer, Inc.

From: Steve Dommer
Project Engineer
VS Engineering, Inc.

Subject: Des. No.: 0100541
Work Type: Road Reconstruction
Route: S.R. 240
Counties: Putnam and Hendricks

Date: November 12, 2002

This is a summary of the discussion and findings made at the field investigation held at the project site at 11:00 a.m., October 21, 2002.

The purpose of the field investigation was to review the existing conditions and determine the general scope of work desired for incorporation into the engineering assessment report. In attendance were the following people:

Steve Isenhower	INDOT Crawfordsville District Program Development Engineer
Jadhav Patil	INDOT Materials and Test Division Assistant Pavement Design Engineer
Nick Reachmack	VS ENGINEERING, INC.
Steve Dommer	VS ENGINEERING, INC.

Mr. James Juricic was invited but unable to attend. Mr. Hasmukh Patel, Janssen & Spaans, was informed of this meeting and invited to provide input. Copies of this memorandum will be sent to them for references and review comments.

1. Mr. Isenhower recommended that this Road Reconstruction/Pavement Replacement Project extend from RP 4 + 17 (beginning of concrete pavement about 700 feet west of Deer Creek Bridge) to RP 10 + 11 (about 200 feet west of McHaffie Branch).
2. S.R. 240 consists of two 10 foot lanes with 2 foot asphalt shoulders. Pavement is asphalt surface in fair condition. Posted speed limit is 55 mph throughout the project limits. Drainage is generally by shallow roadside ditches flowing to cross culverts at sag vertical curves. Within the project limits are three bridges at Deer Creek, Little Deer Creek and Buis Creek. In addition, there are 15 cross culverts of various types (CMP, precast box, cast-in-place box, multi-plate arch) and sizes (18" to 80" x 174"). It appears that all of the small structures are substandard in regards to clear zone distances.
3. The following county roads intersect S.R. 240 at one-way stop controlled intersections with S.R. 240 free flowing.

<u>C.R.</u>	<u>Intersection Leg (North or South)</u>
450 E	S
140 S	S
500 E	S
525 E	N
650 E	S
700 E	N
725 E	S
775 E	N
825E	N
850 E	S
900 E *	N

* Putnam/Hendricks County Line

There are no four leg intersections within the project limits. Immediately east of the project limit is the S.R. 240 bridge over McHaffie Branch; continuing east 300 feet is the two-way stop controlled intersection with S.R. 75 (S.R. 75 free flowing) making up the north and south legs and C.R. 200 South the east leg.

4. The bridge over Deer Creek near the west end of the project was constructed in 1966 and has substandard concrete bridge railing. An eastbound right turn lane to C.R. 450 East has been added and extends onto the bridge deck which affects a substandard shoulder width. The bridge over Little Deer Creek was constructed in 1964, and reconstructed in 2001 consisting of widening, concrete overlay, and concrete railing. The bridge over Buis Creek was constructed in 1966, and concrete overlaid with new railing in 1996.
5. There are overhead and underground utilities along one or both sides of the right-of-way the entire project length.

6. Apparent existing right-of-way varies from 66 feet total (33 feet from roadway centerline) west of C.R. 525 E, 60 feet total (35 feet north of centerline 25 feet south) from C.R. 525 E to 4800 feet east of C.R. 525 E, 50 feet total (25 feet from centerline) to Little Deer Creek bridge, and 40 feet total (20 feet from centerline) to east project limit.
7. It was generally agreed that ideally, this project would involve full-depth pavement replacement on largely the existing horizontal alignment with some adjustments in areas of horizontal curves where practical. Vertical alignment will likewise be examined and, where warranted, revised to meet current design standards for the 55 mph posted (design) speed.

If any of the recipients of these minutes have questions, additions or revisions, please contact the writer.

Sincerely,

VS ENGINEERING, INC.

Steve Dommer
Project Engineer

cc: Attendees
James Juricic
Hasmukh Patel